ELECTRICAL REVIEW

March 28, 1947

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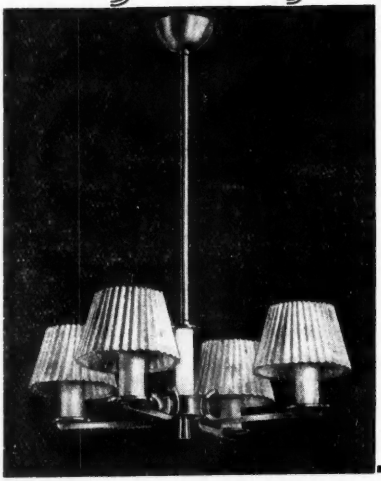

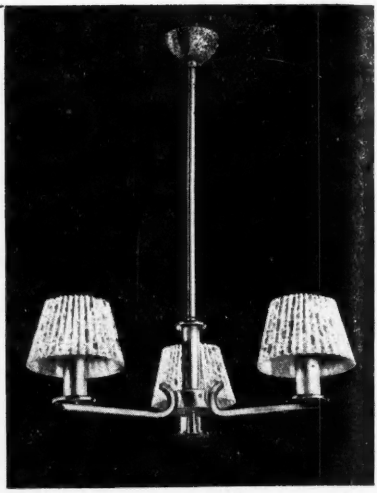

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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Electrical Education

Continuation of E.D.A.'s Work Essential

IF the British Electrical Development Association, with other electricity supply organizations, is to be extinguished by the Electricity Bill there were certainly no signs of obsequies at last week's annual luncheon and meeting. Rather was there an atmosphere of faith in the future of electrical development, with E.D.A. surviving in some form or other.

Electrical development now connotes something rather different from the drive to secure the greatest possible use of electricity for all possible purposes which characterized E.D.A.'s earlier days. Thanks to the exigencies created by wartime conditions and decisions, the unconditional and unlimited consumption of electricity is at present not permissible. It is to be hoped that this restrictive phase will pass in two or three years' time, but even then emphasis will have to be placed on correct and efficient use rather than consumption for consumption's sake.

Teaching Efficient Use

This is not to say that E.D.A. has only just realized where the true interests of the electricity supply industry lie. For some years it has endeavoured to impress upon consumers that they should get full value for their money by following the correct technique in the use of their cookers, water heaters and other appliances. It is just that this factor now predominates. When supply was unrestricted it was in the consumers' own interests to be efficient users; if they were not the cost fell upon them. Now the interests of the whole community, particularly as regards industry, are involved and efficient use is imperative.

There is insufficient coal for the national needs and economy in consumption is essential at all times. There is a shortage of generating plant and calls upon the overburdened system must be restrained at times of peak demand. Equitable rationing of electricity is impossible; there must be an appeal to the civic consciousness and common sense of the people.

New Organization Unnecessary

This means education by all possible methods—in fact just those methods which E.D.A. has developed in the course of its study of the needs and habits of electricity consumers. If E.D.A. did not exist it would be necessary for the proposed Central Electricity Authority to create it. Any new body which might be set up would probably have new ideas regarding its functions, but it is certain that after a period of experimentation it would find itself forced back upon the path which E.D.A. is now pursuing. It would therefore be a waste of time and effort to attempt to re-start from scratch when a ready-made, tried, tested and proved organization for the purpose is already at hand.

One danger which has to be avoided if electricity is not to be hampered, with disastrous results upon industry and unpleasant consequences for the public, is any attempt to fit electrical development into fuel "co-ordination" plans. It is practically certain that the primary purpose

of any such plan would be to ensure the survival of obsolescent methods by the parade of spurious "efficiency" comparisons. Industry and the public demand electricity and must not be deprived of it, provided that they use it intelligently. Without full electrical development this country will fall behind industrially and the standard of living will not rise.

What are Fittings?

DURING the proceedings in committee on the Electricity Bill Sir Arnold Gridley pointed out that the powers proposed to be given to the Area Boards might result in their competing in a large way with contracting firms. He mentioned the possibility of the Boards taking on industrial installations involving motors up to 600 H.P. and costing up to £40,000. Mr. Shinwell endeavoured to allay fears of this happening by stating that the clause did not relate to the provision of electrical plant on a big scale but merely to fittings. But the term "fittings" as defined in the Bill covers "electric lines, fittings, apparatus and appliances designed for use by consumers of electricity for lighting, heating, motive power and other purposes for which electricity can be used." There is apparently no limit on size or cost here.

No Subsidization

IT is true that the Minister went on to say that he "would regard it with disfavour if the Area Boards sought to subsidize in an unhealthy fashion" the production of fittings and thus enter into unfair competition with private traders. He said that there would be a safeguard against this when the accounts were considered, but surely this would be bolting the stable door after the horse's escape. A clearer delimitation of the Area Boards' scope is plainly desirable even though Mr. Shinwell envisages "healthy competition" between them and the contractors.

Machinery Disposal

MEMBERS of the Association of Electrical Machinery Traders have been informed that the Ministry of Supply holds the view that the rate of disposing of Government-held electrical machinery has been disappointing. While it is not proposed to abandon the existing disposals scheme it has been decided that this must be supplemented by public auction sales. The position is accepted by the A.E.M.T. which considers that anything which results in getting equipment on to the market rapidly is to be welcomed in present circumstances. The circumstances are, of course, the shortage of power station plant and the desire of the Government to encourage the use of small generating sets by industrialists. This is an unfortunate but unavoidable reversal of normal electricity supply policy in connection with industrial plant.

New Generating Plant

ADDITIONS totalling 2,321 MW to be made to the capacity of the selected stations detailed on another page complete the sum of new plant due under previous programmes which should be ready for service by the winters of 1948 and 1949. They also cover most of the plant scheduled for 1950. Included in the list are the first sections of eight new stations. In two cases (the Agecroft, Salford, station and the Prince of Wales, Rotherham, station) previous directions have been superseded by arrangements which provide for an increase in the plant to be installed. Capital expenditure is estimated at about £100 million (including the cost of some of the site work required for the completed stations)—a high figure per kW compared with pre-war values and reflecting the price to be paid for postponement of construction necessarily imposed during the war.

Radio Interference

UNTIL the coming of television, radio interference from motor-vehicle ignition was not of the first importance, since it is considerable only in the short-wave regions. During the war it seriously disturbed communication between tanks, for example. The Electrical Research Association, which was closely associated with the Services committee which dealt with the problem, has now undertaken full responsibility for the investigations, the Ministry of Supply contributing to the cost. It is to be hoped that any recommendation calling for legislation that may be made by the new E.R.A. Sectional Committee will not be subject to the delay that has attended the carrying out of the report on sound broadcasting of 1936, which is still in limbo.

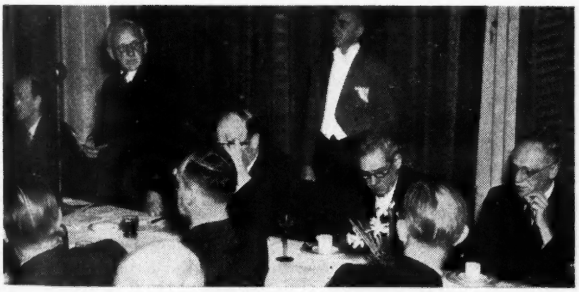
Development To-Day

Accent Upon Electrical Education

THE Home Secretary (Mr. Chuter Ede) was to have been the principal guest at the annual luncheon of the British Electrical Development Association at the Connaught Rooms, W.C.2, last Friday. He was, however, prevented by his Parliamentary duties from attending and his place was taken by Alderman C. W. Key, the Minister of Works. Lord Brabazon of Tara, the Association's president, occupied the chair, and the company of over 600 included representatives of many Government Departments and all branches of the electrical and allied industries.

Apart from the loyal toast there was only one other—" The British Electrical Development Association "—and it was proposed by ALDERMAN KEY. In regretting Mr. Chuter Ede's absence the speaker mentioned that although Mr. Ede was a past-president of E.D.A., his own experience of and participation in the Association's activities was of longer standing.

During the past few years E.D.A. had been responsible for making the people of this country electrically-minded, a task which it had carried out so well that to-day it had proved an embarrassment as the demand had outrun the available plant capacity. This shortage would not easily be overcome but the Government intended to see that production of plant was accorded " top priority," and this applied to the erection of power stations too. The wartime Heavy Electrical Plant Committee, under the Ministry of Supply, was to do everything possible to speed up the manufacture of generating plant.



Alderman C. W. Key (Minister of Works) proposing the toast of the Association

Although many of those present might have strong feelings about the Electricity Bill its purpose was to reorganize and strengthen the electricity supply industry in both urban and rural areas. He maintained that this reorganization was necessary so that the country should have a cheap and adequate supply and in its reorganized form the industry would be able to take full advantage of advances in technique.

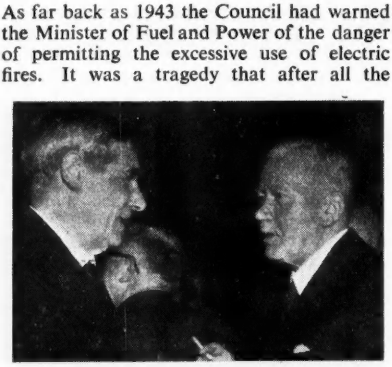
Lady Nathan and Lord Brabazon (President)

The crisis had demonstrated how dependent the country was on electricity. He felt it an honour in view of the Association's valuable services to the country to propose the toast.

LORD BRABAZON, in the course of his response to the toast, referred to Alderman Key's prominent part in electrical affairs in his own district. He regretted the absence of Mr. Shinwell. Last year when Mr. Shinwell was the principal guest he (Lord Brabazon) had been in America and had lost the opportunity of pouring words of wisdom into the Minister's ears and possibly changing his mind.

It might be said that E.D.A. was the cause of all our present trouble, but that would be untrue. The Association had not only encouraged development but had shown the public how to use electricity without waste.

As far back as 1943 the Council had warned the Minister of Fuel and Power of the danger of permitting the excessive use of electric fires. It was a tragedy that after all the



Sir Cyril Hurcomb (chairman, Electricity Commission) and Mr. Selwyn Grant

Association's efforts it had become almost a crime to switch on a light or to go up in a lift after a heavy lunch.

They were glad to note that it was not the Government's intention to continue restriction but to see that the necessary generating plant was provided. Coal consumption must continue to rise but there could be economies. Railway electrification could save 10 million tons annually and the electrification of the mines could save another 8 million tons. The electricity supply industry burned coal which could not be sold anywhere else but it still preferred coal and not earth—they wanted no dealings with the Ministry of Agriculture.

Some might say that E.D.A.'s work was finished but he could not take that view. Its activities were more necessary than ever and there was no body which could do better. The crisis had convinced the country that electricity was the life-blood of industry and the grid lines across the country were the arteries of our productive life.

The gas and electricity industries were cousins but cousins did not always get on well together. He viewed with grave misgivings any suggestion of a marriage between them. This could not produce a healthy progeny even if the Government resorted to artificial insemination; he envisaged a horrible hybrid—a "Unitherm."

Then in playful terms Lord Brabazon dealt with the Electricity Bill, saying how disgraceful it had been that private men should have started electricity supply companies and how repugnant was the suggestion that shareholders and directors should be compensated. The great municipalities with their traditions of local service would be glad to hand over their undertakings. For years the Electricity Commissioners had been wasting their time and he hoped that they would now go down into the mines and do some useful work. What good had the Central Electricity Board done—merely buying and selling current. Now the consumer would be delighted if he were allowed to switch on anything.

Once again he regretted the absence of Mr. Shinwell; he would have received a very warm welcome at that gathering, concluded Lord Brabazon.

Annual Meeting

At the subsequent annual meeting, with Lord Brabazon presiding, CAPT. J. M. DONALDSON was called upon to move the adoption of the accounts before his retirement from the Council after being associated with

Mr. Dale, Mr. E. E. Hoadley, Mrs. Dale and Mrs. H. J. Randall

E.D.A. from its earliest days. Capt. Donaldson touched upon a number of the principal items, mentioning that an increase of £7,000 for advertising was mainly due to the preparation of the "Switch Family Robinson" campaign, which had had to be put into "cold storage." This year exhibition expenses would be well up, partly on account of the participation in the Ideal Home Exhibition. The item "Publications and Technical Services" had been increased by the

"Switch Family Robinson" campaign and by the return of badly-needed technical staff from the Forces.

In seconding the adoption of the accounts, MR. E. E. HOADLEY said that he was pleased to see that the expenditure of the Area Committees had gone up.

The report for 1946 was presented by Mr. H. J. RANDALL, chairman of the Council. He said that the excess of demand over supply (which was likely to continue for some time) had necessitated the revision of the Council's

Mr. R. A. S. Thwaites (Manchester), Mr. Harold Hobson (chairman, C.E.B.) and Mr. H. J. Randall (chairman, E.D.A. Council)

educational and advertising policies. It had been their aim to assist industry and the public to obtain the maximum benefit from the minimum consumption; to educate the public upon the subject of peak loads; and to maintain the industry's goodwill. They had adopted educational and propaganda schemes which would have a long-term effect.

It had been a disappointment that the "Switch Family Robinson" campaign had been held up, but they hoped to launch it at a later time. He maintained that the Association's advisory work was not of a negative character; it had been of first-class instructive value.

The two new films, "Can We Be Rich?" and "A Place in the Sun," were considered to be excellent aids in increasing production. Another was in preparation on the subject of rural electrification. Although this branch of their work might have no immediate benefit it would show results in the years ahead.

Mr. Randall claimed that the E.D.A. memorandum on the Simon Report was the best piece of work that the Association had ever done. In this they had endeavoured to secure a proper place for electricity. Electrification of the cotton and woollen industries had received attention and now the Association was turning to electricity in the coal mines. Rural electrification was being encouraged by exhibits at a number of agricultural shows. Although the shelves were sometimes bare they endeavoured to keep the windows effectively dressed.

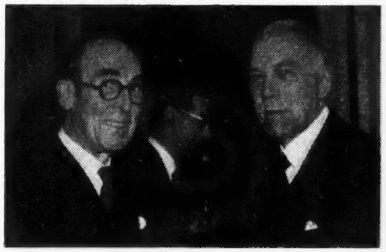
Conference work was increasing in interest and importance. Their activity in connection with domestic science training colleges was an example of long-term policy. About £20,000 was being spent on equipment for these colleges; although they would not get a penny back for some years it was one of the best things they had ever done.

After paying tributes to the general manager (Mr. V. W. Dale) and the staff, to the Electrical Association for Women and Miss Caroline Haslett for their co-operation, Mr. Randall said that whatever changes there might be in future in E.D.A.'s constitution and status, its work would have to go on. It was of inestimable value to the industry and to the community. It would be lamentable if the activities carried on for twenty-eight years were ended or even curtailed, but he had no fears on this score and even hoped that more money would be available for the work.

In seconding the motion, MR. J. S. PICKLES said that members were grateful for and appreciative of the work which the Council had done.

Mr. Randall announced that Lord Brabazon had accepted the office of president for a further year and that Sir Leonard Pearce had been appointed a vice-president for three years.

Appreciation of Lord Brabazon's great interest in the Association was expressed by



Two former E.D.A. directors: Lt. Col. W. A. Vignoles and Mr. A. C. Cramb

MR. F. NEWEY and the vote of thanks which he moved was seconded by BRIG.-GEN. R. F. LEGGE. In responding, Lord Brabazon referred warmly to the energy and ability of the general manager.

In proposing a vote of thanks to Mr. Randall, MR. H. F. CARPENTER, vice-

Mr. V. W. Dale (general manager) and Sir John Kennedy (Electricity Commission) in conversation

chairman of the Council (who was seconded by MR. J. ECCLES), said that there was no need to "gild the iris"—a reference to Mr. Randall's major interest outside his electrical activities. The proceedings concluded with a vote of thanks to the E.D.A. committees and the technical press, proposed by COUNCILLOR J. SELWYN JONES and seconded by MR. W. N. C. CLINCH.

Annual Report

Most of the matters covered in the report for the past year have already been dealt with in the *Electrical Review* and the main points were referred to by Mr. Randall at the meeting. During the year the membership rose from 414 to 434 and the total revenue from £138,584 to £145,877. A new committee was established to deal with all domestic applications of electricity. The committee decided to meet quarterly and to delegate much of the work to sub-committees specializing in cooking, water heating, refrigeration and wiring installations. Proposals for the establishment of an E.D.A.-B.S.I. Testing House and Approvals Committee to test and adjudicate upon appliances which were the subject of complaint was referred to the Area Committees for their further consideration. Collaboration has been arranged with the Electrical Research Association in the carrying out of large-scale experiments on problems of domestic electrification, with particular reference to the load characteristics of different combinations of appliances.

At the first meeting of the new Council Mr. H. F. Carpenter (clerk and manager of the West Midlands J.E.A. and president of the Chartered Institute of Secretaries) was elected chairman and Mr. J. Eccles (city electrical engineer, Liverpool) was elected vice-chairman.

Area Committees

AT the first meeting of the 1947-48 Committees of the South-East & East England Area of E.D.A. the chairmen and vice-chairmen were all re-elected, as follows:—Southern: chairman, Mr. S. J. C. Ellis (Canterbury); vice-chairman, Mr. G. M. Daniels (Sussex E.S. Co., Ltd.). Greater London: chairman, Mr. J. R. Jones (Battersea); vice-chairman, Mr. A. W. Bonell (County of London E.S. Co., Ltd.). Eastern: chairman, Mr. G. P. Dixon (Colchester); vice-chairman: Mr. G. Christy (Aldeburgh E.S. Co., Ltd.).

Mr. G. P. Dixon presided at the annual luncheon of the South-East and East England Area (Eastern Committee) held at the Red Lion Hotel, Colchester, on March 17th. Mr. H. J. Randall, in the course of his reply to the toast

Mr. C. G. Morley-New, Mr. H. Hobson, Sir John Dalton and Capt. J. M. Donaldson

of the E.D.A. submitted by the Mayor of Colchester, said there had been an appalling delay on the part of the planning authorities in providing new generating plant and stations. But for this and the coal shortage they would now be witnessing the biggest boom in the country's history.

Radiocommunication Convention

Review of Wartime Achievements

THE radiocommunication convention being held in London this week has been arranged by the Institution of Electrical Engineers in collaboration with the Government Departments concerned and the manufacturing industry. Its object is to record wartime achievements, which have been obscured by the more appealing radar developments, and more particularly to indicate the prospect and wider scope in civil use of the advances made during the past six years in the art and practice of radiocommunication.

The expansion of this section of Britain's electrical manufacturing capacity is not properly appreciated; neither is its industrial significance, or the way in which makers satisfied the demand for equipment, which was phenomenal during the war and will continue to be large for some years. The value of equipment manufactured has grown from £10 million to £60 million yearly.

The convention is being attended by 35 delegates from France, with others from Russia, Holland and Belgium. The proceedings are being relayed to the service research establishments at Haslemere (Admiralty) and Malvern (Telecommunications), where the principal developments took place.

Opening Ceremony

Some 120 papers have been submitted; 16 are being read and about 80 may ultimately be published. The opening ceremony on Tuesday evening was performed by Sir Stafford Cripps (President of the Board of Trade), and in an introductory address Sir Stanley Angwin (Cables & Wireless, formerly G.P.O.) spoke of the part played by telecommunications in war.

Subsequently at the Savoy Hotel at a joint dinner of the I.E.E. Council (president: Mr. V. Z. de Ferranti) and the Radio Section Committee (chairman: Prof. Willis Jackson) the principal speech was by Mr. T. E. Goldup, who detailed the production aspects of matters discussed during the four-days' (morning, afternoon and evening) technical sessions dealing with ten subjects.

The first was long distance point-to-point communication, summarized by Mr. A. H. Mumford, who emphasized its importance in present-day affairs. The supporting papers described the testing of receivers, design of transmitters and a synthesizing machine for investigating the effects of frequency-selective fading. The second was communication, including mutual radio interference between ships of the Royal Navy. During this session it was hoped to receive a transmission from H.M.S. *Vanguard*, now in South African waters. The third subject was military and aeronautical, including intercommunication systems for aircraft, summarizing what is now being done and what is planned for the future.

Ten papers dealt with the fourth subject (Sir Edward Appleton presiding) representing an entirely new method of radio-telephony by pulse modulation as distinct from frequency modulation and the older system of amplitude modulation.

Beam telephony on ultra-short waves was the fifth subject, indicating the opportunities it offers for establishing short distance radio links, possibly in place of extensive line networks. Examples of services of this kind already in use were quoted. Direction finding was the sixth subject, the thirteen papers including information on the extension of the method to very high frequencies for naval use and descriptions of airborne automatic equipment.

Broadcasting, the seventh subject, was dealt with by Mr. H. Bishop, who gave an account of the wartime activities of the Engineering Division of the B.B.C.

To the discussion on propagation, the eighth item, Sir Edward Appleton contributed a fascinating talk on ionospheric forecasting, explaining how it is now becoming possible to predict storms and electrical disturbances which interfere with radio-communication.

The manufacturing aspects of radio components and their standardization is the ninth subject to be discussed at the main sessions which will conclude this (Friday) evening when Sir Clifford Paterson, who has been intimately concerned with the organization of research into many of the subjects discussed, is to review the Convention proceedings and comment on future trends.

But there will be an additional, tenth, meeting on Wednesday next (April 2nd) to consider continuous wave aids to navigation and aircraft approach and landing systems, including low-reading absolute altimeters.

Empire Scientific Conference Report

A PRELIMINARY report of 67 pages has been issued by the Royal Society on the Empire Scientific Conference which took place in London in June, 1946. It explains the origin of the gathering and conduct of the proceedings, together with brief accounts of the various discussions and the recommendations adopted. Lists are included of the numerous papers submitted, of delegates and steering groups.

The subjects discussed included mapping and exploration from the air with radar aids, scientific information services, Empire scientific co-operation with international organizations, physical standards of measurement, post-war needs of fundamental research and cosmic rays.

Views on the News

Reflections on Current Topics

THERE was a friendly difference of opinion at the E.D.A. gathering last Friday. Speaking at the luncheon Lord Brabazon resented the apparent intrusion of the Ministry of Agriculture into the supply of coal to power stations. At the annual meeting Councillor J. Selwyn-Jones argued that that Ministry was not responsible; the coal came largely from the slate quarries. The truth, as is so often the case, probably lies in between, but in any event these foreign substances are anathema to power station operators who prefer to have their fuel "straight."

* * *

While looking through the Report of the Joint Gas and Electricity Committee of 1939 relating to rationing, I came across a statement of the gas people that the efficiency of utilization of coal by the private consumer is probably little more than 15 per cent, whereas gas for similar purposes gives an efficiency rather more than three times as great. Deducting the heat value of the tar, which Mr. P. Schiller justified in his recent I.E.E. paper, the result is near enough to his figure of 42 per cent to warrant that being taken in future as the production efficiency of gas.

* * *

In *The Times* on Monday, Mr. M. Milne-Watson replied to Mr. V. W. Dale's contention that the therm was not equivalent to 20 kWh as Mr. Milne-Watson stated. He says that the Ministry of Fuel figure which Mr. Dale quoted ($12\frac{1}{2}$ kWh = 1 therm) was subsequently corrected. But this does not dispose of the other figures which I put forward last week, viz., 14 kWh in the 1939 rationing scheme and 18 kWh adopted by Lord Beveridge. It seems that the equivalent depends partly upon the purpose for which it is used and partly (perhaps mainly) on the personal views of the proponent.

* * *

Another correspondent to *The Times* appeals for a relaxation of the electricity restrictions to permit use between 1.30 and 3.30 p.m. on Sundays. I would have thought that Sunday morning was of equal importance in this respect. The writer refers to the "praiseworthy loyalty" with which the restrictions have been accepted by consumers. I prefer "supine acquiescence", having regard to the fact that they have been repressed while gas consumers have been left free to do as they please. I write before an expected announcement on future policy but Mr. Attlee's use last week of the phrase "if and when" in connection with the removal of the restrictions sounded a trifle ominous.

* * *

When the Trade Statistics Bill was under consideration by a Standing Committee of the House of Commons last week Mr. F. J. Erroll asked whether the census forms could not be simplified. He was supported in this by Mr. T. J. Brown who said he had seen five clerks poring over a Board of Trade form and they had been unable to get the drift of it. Mr. J. W. Belcher, Parliamentary Secretary to the Board of Trade, had to confess that he had had similar difficulties and it was probably this admission which prompted the Solicitor-General to move an amendment providing that only those who "knowingly and recklessly" made false statements should be liable to imprisonment. It seems that the Government anticipates some incorrect form-filling from the sheer inability of industrialists to grasp what exactly it is that they are asked to return. Are they consulted in these matters?

* * *

Thermal storage heaters and cookers have never gained a footing in this country although such appliances have had a vogue on the Continent. And yet they are just the thing if electricity cuts are to become a permanent feature of our system. But apart from cuts they can form a very steady load for off-peak hours. The principal obstacle in the way of adoption of thermal-storage cookers is that they necessitate a certain adjustment of technique—always a difficulty in dealing with consumers, but surely not an insuperable one.

* * *

From *Punch* for March 5th:

"I'm going to write a sharp note to the electricity people. Do you know they switched off the current from the standard lamp in my dining-room at two minutes to seven last Thursday evening and haven't switched it on again yet?"

—REFLECTOR.

The Domestic Load

A Further Check on After-Diversity Demands

By H. A. P. Caddell, B.A., W. D. Kennedy, B.Sc.Tech., and G. O. McLean, M.Eng.

SEVERAL recent publications on after-diversity demand have indicated not only its importance but also the widely differing methods by which its characteristics can be estimated, for example, the analysis of a large undertaking's total load curves (Schiller, E.R.A. Report K/T.108), and the synthesis of individual cooker loads at peak periods (McLean, *Electrical Review*, November 15th, 1946). The method here described from its nature, cannot be frequently used, but it gives appliance A.D.D. characteristics in a direct and positive manner and needs the minimum of assumptions. Because of this and because it generally confirms the estimates made by less direct but more readily available methods, the results obtained may be useful not only to those particularly interested in load analysis but also to engineers engaged in day to day planning of distribution systems. The method was proposed by one of the authors (Caddell, *I.E.E. Journal*, October, 1944) as a simplification of an earlier suggestion by Schiller (*I.E.E. Journal*, June, 1942).

Two residential areas, each with 100 to 120 consumers and fed by individual substations were selected, and an accurate census made of consumers' apparatus. For two months in the summer when copper and transformer capacity was ample for considerable out of balance, the service connections were re-arranged so that, as nearly as possible, cooker consumers were connected to one phase, water heater consumers to another and those without either to the third phase. For the few consumers with both cookers and water heaters, two-phase services were provided. Continuous recordings were then taken by recording ammeters in each of the three phases. In view of the season of the year and the good weather throughout, space heating and lighting, except at night, were presumed to be absent.

The number and kW rating of each type of appliance given in Table 1 has been converted, for ease in working, into "per consumer" figures as shown in Table 2. The load has been expressed as average kW per consumer, i.e., the total kW for any particular type of appliance has been divided by the number of consumers connected to that phase. For instance, the section headed

Table 1.—Total connected load

Phase	Area A						Area B					
	R		W		B		R		W		B	
No. of Consumers ..	76		17		8		71		37		20	
	No.of Appl.	kW	No.of Appl.	kW	No.of Appl.	kW	No.of Appl.	kW	No.of Appl.	kW	No.of Appl.	kW
COOKING APPLIANCES												
Cookers	1	6·0	13	78·0	—	—	—	—	34	204·0	—	—
Breakfast cookers ..	—	—	—	—	—	—	2	6·0	—	—	1	3·0
Grills	2	2·0	1	1·0	—	—	—	—	2	2·0	—	—
TOTAL		8·0		79·0				6·0		206·0		3·0
WATER HEATERS	—	—	—	—	8	9·0	—	—	2	2·0	17	20·25
SUNDRY												
(Wash-boilers)	—	—	—	—	—	—	1	3·0	10	30·0	1	3·0
Cleaners	25	12·5	5	2·5	5	2·5	45	22·5	15	7·5	12	6·0
Refrigerators	3	1·5	—	—	1	·5	3	1·5	—	—	1	·5
Irons	43	21·5	17	8·5	6	3·0	53	26·5	29	14·5	17	8·5
Kettles	2	2·0	7	7·0	1	1·0	11	11·0	21	21·0	4	4·0
Radios	70	3·5	15	·75	8	·4	67	3·5	34	2·0	19	1·0
TOTAL SUNDRY (excluding wash-boilers)		41·0		18·75		7·4		65·0		45·0		20·0

" Cooking Appliances " includes one or two breakfast cookers and grills as well as the larger 6 to 10-kW cookers, since times and purposes of use are similar for both.

Though continuous day and night records were taken it was decided to concentrate the analysis on the breakfast period (7.30 to 9 a.m.) on weekdays and the dinner preparation period (11.30 a.m. to 1 p.m.) on Sundays and weekdays. For the latter period the final result is shown in Table 5. The ammeter charts were read at 5-minute intervals and from the readings half-hourly demands were computed on the assumption that power factor was unity and voltage 230. The final results were expressed as kW per consumer for each half-hour. Frequency distribution tables were constructed for all these results, the method employed being illustrated in Table 3, which shows the frequency table for Area A, red phase, Sundays 11.30 a.m. to 1 p.m. A summary of the frequency tables for weekday breakfast and Sunday dinner periods is given in Table 4. In addition to the mean values, coefficiency variations are also given for the periods 11.30 a.m. to 1 p.m. and 7.30 to 9.0 a.m., and this gives a clear indication of the dispersion of the results about the mean. These coefficients of variation may be of value to the distribution engineer when planning a substation network, for they give some indication of divergencies from the mean demands which are experienced.

Table 2.—Average connected load per consumer, kW

Phase	Area A			Area B		
	R	W	B	R	W	B
No. of Consumers ..	76	17	8	71	37	20
Cooking appliances ..	·092	4·629	—	·084	5·564	·150
Water heaters	—	—	1·125	—	·054	1·191
SUNDRY						
(Wash-boilers) ..	—	—	—	·044	·810	·150
Cleaners	·165	·147	·317	·317	·202	·300
Refrigerators	·020	—	·062	·021	—	·025
Irons	·284	·500	·375	·373	·391	·425
Kettles	·026	·412	·125	·155	·567	·200
Radios	·046	·044	·050	·047	·046	·047
TOTAL SUNDRY (excluding wash-boilers)	·541	1·103	·929	·913	1·206	·997

Though an attempt was made to segregate electrically the major loads, the amount of sundry load varied between consumers on different phases and some means had to be devised for taking care of this variation, which is shown in Table 2 to have a ratio as high as 2 : 1. It was decided, therefore, to subdivide the connected load into cooking, water-heating and sundry appliances and to write down the normal equations of the demand during the analysis periods using the symbols C, H and S for the kW demand per kW of connected load for the three sections. For example, Tables 2 and 4 show that the red phase in Area A for the Sunday test period has connected loads per consumer of 0·092 kW for cooking and 0·541 kW for sundry appliances. The mean demand for the test period 11.30 a.m. to 1 p.m. is 0·050 kW per consumer, and the equation for this set of conditions must be $0{\cdot}092\ C + 0{\cdot}541\ S = 0{\cdot}050$. For each phase and each period a similar equation was written down and the three simultaneous equations were then solved to obtain values for C, H and S, given in Table 5.

Regarding wash-boilers which are included in " Sundries " in Table 2, it may be argued that they are a legitimate part of the water-heating load. We believe our allocation to be justified, however, because of the improbability of their use during test periods,

Table 3.—Frequency distribution of ½-hour demands

SUNDAYS—Period 11.30 a.m. to 1 p.m. RED PHASE—AREA A.

Amps/consumer		Frequency			
Range	Mid-value	11.30–12.0	12.0–12.30	12.30–1.0	11.30–1.0
·05 – ·10	·075	1	1	—	2
·10 – ·15	·125	4	1	2	7
·15 – ·20	·175	1	2	2	5
·20 – ·25	·225	4	5	4	13
·25 – ·30	·275	3	2	3	8
·30 – ·35	·325	—	1	1	2
·35 – ·40	·375	—	1	—	1
·40 – ·45	·425	—	—	1	1
TOTALS		13	13	13	39
Average—Amps per consumer		·200	·223	·226	·216
Average—kW per consumer		·046	·051	·052	·050
Coefficient of variation					34%

and during the Sunday test period the wash-boiler component has been omitted completely from the calculations.

Table 4.—Average ½-hour demands, kW per consumer

Phase	Area A			Area B		
	R	W	B	R	W	B
SUNDAYS						
Period—						
11.30 a.m.to 12.0 noon	·046	·764	·501	·125	·845	·368
12 noon to 12.30 p.m.	·051	·851	·519	·108	1·030	·587
12.30 to 1.0 p.m. ..	·052	·740	·409	·095	1·085	·575
Period—						
11.30 a.m. to 1.0 p.m.– Mean	·050	·785	·475	·110	·990	·577
Coefficient of variation, per cent	34	20	35	28	16	17
WEEKDAYS						
Period—						
7.30 to 8.0 a.m. ..	·048	·271	·380	·085	·384	·377
8.0 to 8.30 a.m. ..	·073	·337	·350	·091	·446	·428
8.30 to 9.0 a.m. ..	·068	·364	·368	·079	·389	·481
Period—						
7.30 to 9.0 a.m.— Mean	·063	·322	·354	·083	·407	·430
Coefficient of variation, per cent	35	30	49	29	20	31

Several features amongst the results in Table 5 are worthy of notice. The values of C in the two areas for the Sunday cooking period show good agreement, while the maximum value for a half-hour period is almost the same in the two areas, except that it occurs half-an-hour later in Area B. If the average rating of a full-size cooker is taken as 6 kW the results show that the Sunday cooking peak amounts to a little over 1 kW per cooker after taking account of diversity at a single distribution sub-station. There would, however, appear to be a further diversity between residential areas by means of which the demand on the system is reduced to 0·9 kW per cooker. Again, there is very good agreement between the two areas for the weekday breakfast-period demands. The weekday dinner-period demand is roughly half of the Sunday figure, namely 0·07 and 0·066 kW instead of 0·154 and 0·151 kW.

Turning next to the water-heating figures (Column H), there is not such consistently good agreement between the two areas, but for the whole Sunday period the difference is only 3 per cent—the same as the cooking divergence. It would appear that Area A has too few water heaters (only eight) to give satisfactory results, but from the Area B results (Table 5), it seems fair to deduce that at peak time on Sundays, the water heater diversity is about 2½, and on weekdays at breakfast time it is probably slightly higher. These figures may surprise some readers who are enthusiastic about water heating load and think it is complementary to the domestic cooking load. We can, perhaps, reassure them that records show this load to have a better load factor than cooking because of its use at other times of the day, but other investigators (Bolton, E.R.A. Report K/T.105) have shown that the m.d. occurs between 8.30 and 9.0 a.m. on weekdays.

Sundry appliances are so diverse that one cannot expect consistency in the values obtained for S, but it seems to be fairly clear from Table 5 that the after-diversity demand at cooking periods is about 0·1 kW per kW connected (i.e., diversity factor of 10), but at other times of the day different results may be obtained, if, for instance, there is a favourite time for ironing or house cleaning.

Table 5.—kW demands per kW load connected

Demand Component	Area A			Area B		
	C	H	S	C	H	S
SUNDAYS						
Period—						
11.30 a.m. to 12.0 noon	·151	·396	·059	·120	·356	·126
12.0 noon to 12.30 p.m.	·168	·407	·066	·159	·386	·104
12.30 to 1.0 p.m. ..	·143	·304	·072	·172	·387	·088
11.30 a.m. to 1.0 p.m.	·154	·367	·066	·151	·376	·107
WEEKDAYS						
Period—						
11.30 a.m. to 1.0 p.m.	·070	·398	·056	·066	·223	·067
WEEKDAYS						
Period—						
7.30 to 8.0 a.m. ..	·039	·270	·082	·036	·230	·086
8.0 to 8.30 a.m. ..	·042	·206	·128	·044	·267	·091
8.30 to 9.0 a.m. ..	·051	·230	·117	·038	·323	·079
7.30 to 9.0 a.m. ..	·043	·225	·109	·040	·276	·083

In conclusion, the authors realize that the results depend on the saturation factors of the appliances as well as consumers' habits. A large number of samples with different saturation factors for the major appliances would have to be analysed before a general theorem could be enunciated for computation of after diversity demands.

NEW BOOKS

Filters, Radio Servicing and Mechanics

Electric Filters. By T. H. Turney. Pp. 170; figs. 109; index. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 25s.

The subject of filters, attenuators and phase-shifting networks is necessarily a somewhat difficult one and many practical communication engineers and students need a book which presents the essentials in the simplest possible way. It is, however, very doubtful whether they will welcome this one. The chief difficulty is that the standard of intelligence and knowledge assumed on the part of the reader undergoes the most violent fluctuations. The very first paragraph sets the tone of the whole volume. The reader is assumed to appreciate the significance of the terms " pure resistance," " characteristic impedance," " far end closed with the proper resistance," before he begins. Then after 17 pages, including some talk of real impedance, pass-bands and a hyperbolic function, all taken for granted, he is treated to a paragraph like this: " If one goes to buy an electric iron or a lamp, one wants to know the current it takes. Impedance tells this for different frequencies."

The whole book seems to be rather carelessly written in this vein and is therefore no book for the real beginner. The engineer who has already a good practical knowledge of the subject and wants to acquire a rough and ready acquaintance with the mathematical equations which it involves may find some of the author's simplified proofs helpful, but he should be prepared for the shock of meeting sentences like this: " Lately it has been found that a flat piece of quartz placed between two metal plates gives a ' reactive ' voltage when a pressure is fed to the electrodes. This is due to the so-called ' Piezo-effect '."—L.H.

Wireless Servicing Manual. By W. T. Cocking. Pp. viii + 328; figs. 143. Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 10s. 6d.

In ten years there have been seven editions of this book, with eight impressions of the sixth and two of the present revised edition, which consists of twenty-seven chapters with five appendices. Correct diagnosis must precede proper treatment so this book commences by discussing the choice of appropriate testing equipment, which is of some importance, particularly as unbiased information about it is not too easily obtainable.

The author describes those methods which his considerable experience has shown to be the most suitable. His arrangement of the material in this book is one of " symptoms " rather than " defects," which he rightly believes makes the book handier for reference. With the same aim in view, special attention has been paid to the index, while the appendices contain much tabulated information that is commonly needed when servicing receivers. There is no attempt at theorizing, for this is a book essentially for the repairer.—W. O. F.

Practical Mechanics For All. Edited by Leroy A. Beaufoy. Pp. 448; illus.; index. Odhams Press, Ltd., Long Acre, London, W.C.2. Price 9s. 6d.

This is an excellent book for the specific purpose for which it was written, but the title hardly gives a correct idea of that purpose or its scope. To the technically trained engineer and the student, the term " practical mechanics " covers the experimental work carried out in the laboratory to illustrate the principles and theories dealt with in the lecture room during the study of the science of mechanics. Mechanics is defined as the science which deals with the action of force upon matter, but while force is subsequently defined as that which produces or tends to produce motion in a body, the term " mechanics " is not usually taken to include all the diverse manifestations of force met with in practically every branch of engineering science as it is in this book, although by a literal interpretation of the word this might be justified.

The book is the work of a number of authors, each of them a specialist in his own particular subject, and while it contains chapters dealing with what the technically trained man remembers as statics, dynamics, hydrostatics, hydrodynamics and so on, it goes much further and deals with the applications of the elementary principles of mechanics to such branches of engineering science as the theory of structures, strength of materials and hydraulics. All these chapters are extremely well written and very clearly illustrated, and they succeed in explaining in simple language, by reference to actual practical applications, the principles and processes normally reserved for second and third year students. Thus, in the chapter " Forms of Energy " the fundamental principles underlying the operation of an electrical generating station are very clearly set forth and, in dealing with the testing of machinery, the electric dynamometer is described and illustrated. There is also a very interesting chapter dealing with the mechanics of flying.

The book is very reasonable in price and should make a wide appeal to practical men engaged in any branch of engineering who are desirous of understanding the scientific principles which govern their work. It can also be recommended to the student and even to the technically trained engineer for its clear and concise explanation of fundamental principles.—A.R.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

"The Crisis and After"

IN your issue of March 7th "Electricus" draws attention to certain problems, the majority of which come under the heading of financial charges. Surely the main problem is not basically financial, but is that of increasing the availability of electricity to industrial and domestic consumers at the most rapid rate, up to a usage in accordance with the possibilities of this form of power?

I have usually found in other spheres that if one plans for an adequate volume of production, whether it be of motors or electrical units, the cost per unit invariably tends to become satisfactory.

We have been told on many occasions that the industrial efficiency of the United States is much higher than in this country, and there is more power available to the elbow of the average American worker than is either wanted or supplied in this country. The figures quoted by "Electricus" confirm this, and although it is difficult with exactitude to separate domestic and industrial loads, it would appear that the average American citizen consumes almost twice as much electricity as his counterpart does here.

How to narrow this gap is therefore the real problem, and I sincerely hope that the electricity supply authorities will not, after many years of pressing the claims of electricity, work themselves into a restrictionist policy which, however necessary it might be as a very short-term issue, might easily create an attitude of mind which would hold back our industrial recovery for a very long period.

Rickmansworth. W. PUCKEY.

Trading Policy in Eire

THE Executive Council of the Society of Irish Electrical Traders has had reports of certain British electrical manufacturers appointing as representatives in Ireland parties who are not recognized by or included in the list of approved traders compiled by the Society. The action complained of is not in the best interests of the manufacturers concerned or the electrical trade in this country.

The Society is the only organization catering for and representative of the electrical trade here, wholesale and retail, and is anxious naturally, that electrical trading should be confined to the proper channels. We would be obliged if you would publish this letter, and we would add that we shall be pleased at any time to afford any information in this respect in response to any inquiries.

M. J. O'CONNOR, *Secretary.*

28-29, *Upper O'Connell Street, Dublin.*

Electric Motor Supplies

THE shortage of electric motors continues to form one of the most severe bottlenecks in industry, and within recent weeks the delivery times quoted by British manufacturers have become even more extended, in some cases reaching the all-time record of four years. This is an extremely unhealthy state of affairs, pregnant with many possibilities, some of which may well prove to be highly disagreeable, if not, indeed, disastrous to many concerned with the manufacture and marketing of electric motors.

The export demand, both for direct purchases, and, to a larger extent, for machinery of which an electric motor forms an essential part, is one of the chief causes of the inflated order book position, but, in my view, it is a grave mistake to assume that this situation will continue for an indefinite period.

Unpleasant though the prospect may be, the fact remains that within recent weeks there have been many signs of a change in the export market. The most violent of these is the news from Sweden during the last few days. For many months there has been a substantial demand from Swedish sources for British electric motors, despite the fact that, before 1939, Sweden was a large exporter of such machinery. Now, with little, if any, warning, this market, so far as the British exporter is concerned, has largely disappeared, probably for a long time.

The same situation can arise quickly in other foreign markets, albeit through different causes, some of which are already apparent. It would seem obvious, therefore, that the very extended time now being quoted by the British manufacturer may be considerably reduced at no distant date, with a consequent return to trading conditions somewhat more

sane and realistic than those under which British industry now suffers.

I would like to suggest that those whose job it is to place orders for electric motors to fill estimated requirements over a period, can help to bring about a more healthy condition if they refrain from placing orders on the basis of the delivery times which are now quoted, and wait a year, very probably less, and then place their orders in the light of the conditions then existing.

*London, N.*1. W. E. LAWTON.

Diesel-Electric Locomotives

L.M.S. Main-Line Experiments

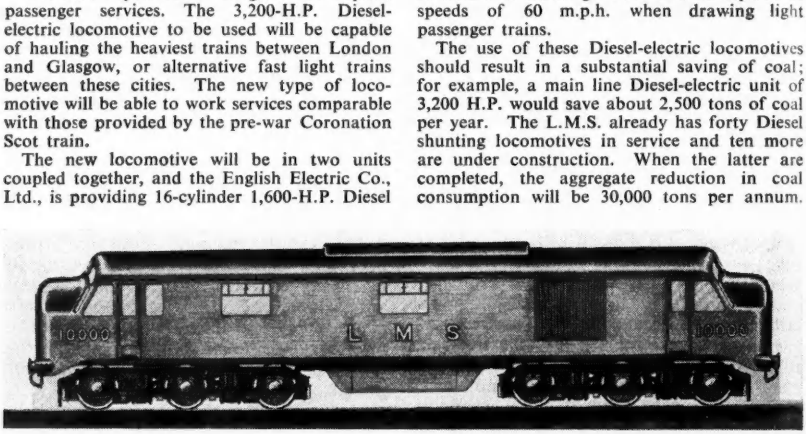
THE L.M.S. Railway is to introduce Diesel-electric locomotives for experimental use on its main line passenger and freight services, including the most important express passenger trains on Anglo-Scottish services.

The first experimental design is for express passenger services. The 3,200-H.P. Diesel-electric locomotive to be used will be capable of hauling the heaviest trains between London and Glasgow, or alternative fast light trains between these cities. The new type of locomotive will be able to work services comparable with those provided by the pre-war Coronation Scot train.

The new locomotive will be in two units coupled together, and the English Electric Co., Ltd., is providing 16-cylinder 1,600-H.P. Diesel engines and electrical equipment for each unit. The design will be based on the engine used in the L.M.S. Diesel-electric shunting locomotive. The L.M.S. is building the mechanical parts of both units in its Derby workshops. The weight of the locomotive will be 220 tons, and it will be capable of speeds of 100 m.p.h.

A second experiment will be the use for separate work of each of the two units which make up the express passenger locomotive. These 1,600-H.P. locomotives will be used for suburban and semi-fast passenger trains and medium weight main line freight services such as are now hauled by large 2-6-4 tank steam locomotives. As a third experiment a 800-H.P. Diesel-electric locomotive is to be constructed suitable for branch and cross-country passenger and freight services. The 16-cylinder Diesel engine, generator, traction motors and control gear will be provided by the British Thomson-Houston Co., Ltd. The engine will be built by Davey Paxman, as sub-contractors to B.T.H., to a design developed for the Admiralty during the war. To obtain the highest possible use of the locomotive, it is being designed so as to be capable of secondary passenger and freight services and shunting. It should be capable of speeds of 60 m.p.h. when drawing light passenger trains.

The use of these Diesel-electric locomotives should result in a substantial saving of coal; for example, a main line Diesel-electric unit of 3,200 H.P. would save about 2,500 tons of coal per year. The L.M.S. already has forty Diesel shunting locomotives in service and ten more are under construction. When the latter are completed, the aggregate reduction in coal consumption will be 30,000 tons per annum. The company plans to build 100 more of these Diesel-electric shunting units in the next six years.



Artist's impression of one of the L.M.S. new 1,600 H.P. Diesel-electric locomotives

Export Inquiries

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territorities. We shall be glad to pass on to them replies received from readers which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

Persia.—A Persian manufacturers' representative, now in England, desires to get into touch with British makers of electrical equipment and apparatus, installation material and accessories, and radio apparatus (X.175).

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT is announced that **Mr. G. P. Barnett,** one of H.M. Deputy Chief Inspectors of Factories, is to be Chief Inspector in succession to Mr. H. E. Chasteney, whose death was recently announced.

Mr. C. R. Westlake, general manager and engineer, Finchley Corporation Electricity Department, has just returned by air from Uganda, where he has been carrying out, on behalf of the Uganda Government, a survey of potential demands in the Protectorate and of possible hydro-electric resources to meet these demands.

Mr. F. S. Taylor, deputy general manager of Newcastle-on-Tyne Corporation Transport and Electricity Department, has been appointed general manager in succession to the late Mr. H. C. Godsmark. Mr. Taylor joined the undertaking in 1931 as assistant accountant. In 1933 he became personal assistant to the general manager and ten years later was made commercial assistant. Since last July Mr. Taylor has been in control of the Department owing to the long illness and death of Mr. Godsmark. The post carries a salary of £1,400 rising to £1,700.

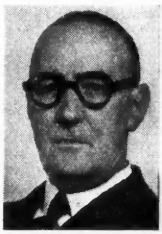
Mr. G. G. L. Preece, M.I.E.E., is retiring from the position of sales manager to Bruce Peebles & Co., Ltd. at the end of this month. Mr. Preece was born in 1880 and is the son of the late Mr. G. E. Preece, at one time secretary to the Society of Telegraph Engineers (now I.E.E.), works manager and chief electrical engineer to W. T. Glover & Co., Ltd., and nephew of the late Sir William H. Preece. He was educated at Manchester Grammar School and Manchester School of Technology. In 1895 he joined W. T. Glover & Co., Ltd., with whom he became chief electrician in charge of the Test Department. Later, he became special technical outside representative dealing particularly with electricity supply and mining work. He was a founder member of the Association of Mining Electrical Engineers and has been a member of the Institution of Mining Engineers for forty years. In 1910 Mr. Preece joined Bruce Peebles & Co., Ltd., specially in connection with mining work, and in the following year he was appointed branch manager of the Manchester district, including Lancashire, Yorkshire, North Wales, Derby and Notts. He served in France during the 1914-18 war. He returned to Bruce Peebles & Co., later becoming sales manager for the North of England and in 1935 he was appointed general sales manager to the company in Edinburgh.

Mr. G. G. L. Preece

He was chairman of the North-Western Centre of the I.E.E. for the year 1933-34 and has served on the Committee of the Scottish Centre. Mr. Preece intends to continue active participation in the electrical industry; his address is 42, Moray Place, Edinburgh, 3.

Mr. T. A. Margary, the former engineer and manager of the Wolverhampton undertaking and **Mr. G. H. Oldroyd,** retired engineer and manager of the Stockport Electricity Department, have been elected associate members of the Incorporated Municipal Electrical Association.

Mr. R. G. Devey, whose retirement from Lever Bros., Port Sunlight, Ltd., was recently reported, has gone into business as a consulting industrial electrical engineer. Mr. Devey has had a wide and long experience in the industrial electrification of factories of various kinds in this country and abroad and has studied the problem of process steam and generation of electricity for group factory working. His present address is "Rathmore," Noctorum, Birkenhead.



Mr. R. G. Devey

Mr. Hedley Large, who has been borough electrical engineer of Stoke Newington for the past nineteen years, is retiring from that position on April 28th. Mr. Large was born at Hackney in 1884. He attended Owen's School, Islington, and the Finsbury Technical College. After experience with the Aston Construction Co., the Central London Railway, the Bournemouth & Poole Electricity Supply Co. and Walton-on-the-Naze Electricity Department, he went to Stoke Newington as assistant engineer. From 1914 to 1928 he was deputy borough electrical engineer, being promoted to his present position in the latter year. He is an associate member of the I.E.E. His address is 217, Lyndhurst Road, London, N.22.

Mr. F. H. Halestrap, chief engineer and director of Dewrance & Co., Ltd., retired recently and is succeeded by **Mr. J. H. Gibson.** Mr. Halestrap remains a director and will continue to act in a consultative capacity to the company.

Mr. C. M. Cohen, managing director of George Cohen, Sons & Co., Ltd., has been appointed chairman. He remains managing director and succeeds Mr. L. Levy, who remains on the board.

Mr. J. L. Taylor, A.M.I.E.E., M.Amer.I.E.E., technical superintendent with the Mid-Lincolnshire Electric Supply Co., Ltd., has been appointed deputy engineer and manager with the City of Oxford Electricity Supply Department. He takes up his new duties in May.

Mr. F. G. Allen has retired from the General Electric Co., Ltd., after over forty-eight years' service, the last thirty of which was with the Electrical Accessories Department. Mr. Allen was chairman of the old Electrical Accessories Association for four years, and later was actively engaged in building up the Electrical Accessories Section of B.E.A.M.A. of which he was chairman for eleven years. He was for several years a member of the Fair Trading Council.

Mr. Alex. C. Lindsay, station engineer at Dalmarnock generating station, is due to retire from the service of Glasgow Corporation in April. It is proposed that **Mr. R. Scott,** B.Sc., assistant station engineer, shall be promoted to the position of station engineer at the commencing salary of £895 per annum, **Mr. Robert M. Gray,** senior engineer-in-charge, becoming assistant station engineer at a salary of £743 per annum, and **Mr. Mansfield T. King,** engineer in charge, being appointed senior engineer-in-charge at a salary of £644 per annum.

Mr. C. E. W. Barrett, who retired on March 21st from the position of consumers' engineer with the Twickenham undertaking of the London and Home Counties Joint Electricity Authority, was on that date entertained at lunch by present and past members of the staff at the Cadena Café, Richmond. A presentation consisting of a gold pencil, a cheque, and an illuminated address was made later in the day by Mr. S. F. Osborne, district manager. Mr. Barrett has had forty-four years' service with the undertaking, originally under Edmundsons Electricity Corporation and subsequently with the J.E.A. He is succeeded by **Mr. W. A. Bird,** A.M.I.E.E., A.M.I.Mech.E., of the Sutton District of the J.E.A.

Mr. I. R. Galloway has been appointed mains assistant with the Kirkcaldy Burgh Electricity Department. He was educated in Edinburgh at Daniel Stewart's College and at Heriot-Watt College and received his training with the Lothians Electric Power Co.

Mr. E. N. Bray, of E. N. Bray Ltd., has retired from active work, but remains a director. The business will be carried on by the remaining directors and staff as before.

Mr. J. Tattershall, who has just been appointed mains superintendent with Cleethorpes electricity undertaking, was previously deputy mains engineer at Barnsley.

Mr. G. W. Godfrey has been appointed general sales manager of the Radio Division of E. K. Cole, Ltd., and assumes responsibility for the general conduct of sales and service, with **Mr. E. W. Shepherd** continuing as service manager. **Mr. Bentley Jones** succeeds Mr. Godfrey as radio sales manager. **Mr. R. S. Underwood** is Southern Area manager, and **Mr. R. A. Drummond** Northern area manager.

Mr. F. B. Ogan has retired after nearly twenty years' service with the London Electric Wire Co. and Smiths, Ltd. Inquiries should now be sent to the London branch of the company, 31/33, Spenser Street, S.W.1 (Victoria 0504).

The Salford Corporation is advertising for a city electrical engineer in succession to **Mr. L. Romero,** who is retiring. A commencing salary of £1,400 rising in two years to £1,650 is offered. The Standing Joint Committee of the Associated Municipal Electrical Engineers and the Electrical Power Engineers' Association contends that under the "Walker" Agreement the salary should be £1,833 rising to £2,156 in the third year.

After a lapse of eight years owing to the war the Dramatic Section of the Bournemouth Electric Club resumed activities on March 13th to 15th by presenting in the pavilion of the Club's sports ground J. B. Priestley's "Mystery at Greenfingers." Large audiences of the staff of the Bournemouth & Poole Electricity Supply Co., Ltd., and their friends attended on each evening, and the production proved very successful. The players were Miss Nesta Bennett, Mr. C. Adams, Mr. V. Newton, Mr. R. Jeal and Miss Grace Nicolson, in the leading parts, with Miss Kathleen Vincent, Mr. R. Yorston, Miss Jean Wallace, Miss Jean Cox and Miss Naomi Martin.

The annual dinner of the Admiralty Electrical Engineers' Association was held recently at Foxhill, Bath, presided over by **Mr. L. A. Sansbury,** M.I.E.E., the president. The guests included Mr. A. E. Newburn, city electrical engineer, Bath, Captain Bateson, head of the Naval Electrical Branch, and Mr. J. H. Chapman, vice-president of the Royal Corps of Naval Constructors' Association. In proposing the toast of the Association, Mr. A. McL. Mooney, said that a high proportion of electrical engineers in the Director of Electrical Engineering's Department belonged to the Association. Mr. Sansbury, in reply, said that the Association had covered a tremendous amount of work during the past year and would continue actively to consider all items which affected its members in the future. The Director of Electrical Engineering, Mr. H. D. MacLaren, in proposing the toast of the guests, said that Admiralty electrical engineers would play a big part in the future development of electrical engineering. Captain Bateson, who replied, said that the new Naval Branch was gradually taking shape. A strong liaison between the Naval officers as users and the civilian electrical engineers was most essential for the efficient working of the complex electrical equipment now being fitted to H.M. ships.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Mr. O'Brien asked the Prime Minister how much fuel and power were saved by cutting off six hours' broadcasting a day; and when normal broadcasting would be restored. Mr. Attlee said that the greater part of the saving of electricity was effected by the persons who would be receiving and not by the B.B.C.; the amount could not be calculated. The position would be reconsidered if and when these prohibitions were modified or withdrawn.

Fuel Saving

Mr. Barnes said that about 10,000 tons of coal a week would be saved from June 16th when the summer transport time-tables would operate.

New Poplar Station

In reply to a question by Mr. Guy as to what progress had been made with the building of the new Poplar power station, Mr. Shinwell said that contracts had been let for demolition, dredging and the construction of culverts on the site, and for the building of turbine and boiler plant.

Colliery Power Stations

Mr. Shinwell said that in the year ended June 30th, 1946, there were 86 mines in South Wales and Monmouth where electricity was generated at the mine and 33 of these also received supplies from authorized electricity supply undertakings; 129 mines received electricity from authorized supply undertakings alone. Information was not available as to the number of colliery generating stations which had been closed.

Water Power

Mr. Champion asked the Minister whether he was considering the possibility of the utilization of the potential energy in the water supplies to towns in those instances where there was a considerable fall from the reservoir to the point of supply to the public. Mr. Shinwell said that the Electricity Commissioners in consultation with the Ministry of Health were investigating cases where a sufficient head of water might be available for generating electricity.

Interference with Radio Reception

Mr. Burke, the Assistant Postmaster-General, said that legislative action to provide for the compulsory suppression of electrical interference with radio reception was being considered.

Power from Submarines

Mr. Dugdale, Parliamentary Secretary to the Admiralty, said that Diesel-engine generating plant and batteries were not removed from captured German U-boats before they were sunk. This equipment formed an integral part of the U-boats and it would not have been possible to remove it within the time set for carrying out the sinking under our international obligations. Salvage operations would not be possible.

Electricity Bill

STANDING Committee E of the House of Commons spent some time last week in considering the composition of the Consultative Councils to be set up under the Electricity Bill. Mr. Walter Elliot had moved an amendment to make these councils "Consumers'" Councils, instead of "Consultative" Councils. This amendment, he explained, was the first of a series, which, if carried, would provide for both Consultative Councils and Consumers' Councils. There was a great divergence of view, and often of interest, between the industrial consumer and the ordinary domestic consumer. The Consumers' Council would keep the consuming public in touch with this great undertaking.

Mr. Shinwell, the Minister of Fuel and Power, said they were all agreed that in the provision of electricity supply it was desirable to create some form of local council to maintain contact between the consumer and the authority responsible for distribution. Under the Coal Act they provided for two kinds of Consumers' Councils—one industrial and the other domestic. These concerned themselves solely with the interests of the consumers in respect of prices, supplies and quality.

There was a substantial difference between these Councils and the Consultative Councils, because the latter would be endowed with powers and be called on to undertake activities far wider. They had, for instance, to deal with any matter affecting the distribution of electricity and they had to consider variations in tariffs. They had to deal with the provision of new or improved services and facilities within the area. Those were matters which neither the Industrial nor the Domestic Consumers' Councils in the coal industry were called on to do; their powers and duties were very limited. In this case the Councils would be, he hoped, live bodies exercising a great influence over the activities of the Area Boards and seeking to extend electricity supply in every possible direction.

In the case of the coal industry, the Con-

sumers' Councils were called on to report to the Minister, and the Minister must lay an annual report of their activities before Parliament. In the case of the proposed Consultative Councils, however, they were not called on directly to report to the Minister: they had to enter into consultation or into what might be regarded as a fully fledged partnership with the Area Boards. Over and above that, the chairman of each Consultative Council would be a member of the Area Board, and in that way there would be an effective liaison between the two bodies.

The Government had decided that the best form of organization was a three-tier structure —the Central Authority, the Area Boards and the Consultative Councils, who would act in unison. Over and above that provision was made to enable the Consultative Councils to establish district committees within their areas. Therefore, right from the chairman of the Central Authority down to the humblest consumer, or potential consumer—there was a link, as a result of which he hoped they would be able to provide for the electrical needs of every person in the country.

Annual Reports

Lord Hinchingbrooke felt that the word " consultative " had rather a jejune connection. Mr. R. S. Hudson pointed out that the Bill provided the consumer with far fewer statutory safeguards than he had at present, in contradistinction to the Coal Act, which provided the consumer with greater safeguards than he had previously. There was a great deal to be said for stipulating that the Councils should issue two annual reports to the Minister, to be laid before Parliament, as in the case of the Coal Act. Mr. Blyton hoped the Minister would see that the local authorities had a majority on these Councils.

Sir Arnold Gridley thought the Clause as it stood unwieldy and unworkable. If he were a member of one of the Area Boards he would most strongly resent being put under an obligation to notify a body composed mostly of non-technical people of precisely how he proposed to carry out the functions entrusted to him by Parliament. The machinery devised in the Clause was delaying, cumbersome and interfering.

Mr. Gaitskell, replying for the Government, said that these Consultative Councils would have to represent the consumers' interests in the narrower sense of the term. Their second function would be the wider one of considering the general plans and arrangements made by the Area Boards. He did not agree with Sir Arnold Gridley that the system would not work. Nobody disagreed with the view that the local authorities must have a large representation upon these councils, but the Government did not wish to be tied down precisely. There might be circumstances in which it would be reasonable for the local authority representatives to be quite definitely in the majority, but there might also be cases where they had not been interested in the development of electricity and where electricity had been supplied by private companies: in the latter circumstances local authorities would not have a strong claim.

The amendment was negatived.

Several amendments were then put forward making suggestions for various ways of choosing the composition of the consultative councils. All these the Government resisted. On one, moved by Mr. Palmer, to give the employees in the industry representation, Mr. Gaitskell suggested that in view of the fact that the Government was introducing an amendment on the Report stage covering organized labour it was really unreasonable to urge that they should make specific provision for the representation of the employees in the industry.

The amendment was negatived.

Mr. R. S. Hudson moved an amendment to provide that the annual reports of the Councils should be published.

Mr. Shinwell promised to look at this matter again and the amendment was withdrawn, and the clause agreed to.

On a later clause on an amendment to provide that July 1st, 1948, should be the vesting date, Sir Arnold Gridley said that at present both municipal undertakings and private enterprise were in a state of uncertainty when they would be acquired. Such uncertainty was not good for the Government, for the undertakings or for the consumers.

Mr. Gaitskell said that a degree of uncertainty was unavoidable. They did not know when the Bill would be through Parliament, or when the Central Authority and Area Boards would be set up, although that would be done as soon as possible after the Bill had become law. Under the Bill directors would receive fifteen months' notice, which was a longer period than usual.

The amendment was negatived. A further proposal that the Minister should make an Order for the vesting date to be not less than six months before the date was negatived.

Tube Railway Extension

GOOD progress is being made with the G.W.R. and London Transport joint scheme, held up during the war, to extend the Central London Railway from North Acton to Greenford and Ruislip. The work entails the completion by the G.W.R. of 8¼ miles of electrified double track. Seven new stations of the " island " platform type are to be constructed. Power supply will be provided by new substations at Brentham, Greenford, Northolt, and Ruislip and extensions to the existing G.W.R. substation at Old Oak Common. With the completion of the scheme Central London trains will run direct from East London, the City and West End to Greenford and Ruislip in the west. The first section to be opened will be that between North Acton and Greenford.

Industry and the House

Constructive Aims of the Opposition

By F. J. Erroll, M.A., A.M.I.E.E., M.P.

"WE are not afraid," said Mr. R. A. Butler, in the Commons debate on the Economic White Paper, "of the use of the State." The remark, coming from the chairman of the Conservative committee of politicians and industrialists which is preparing a report on the Party's policy for industry, is not, I believe, without a wider significance. It offers a clue moreover to the slowly emerging pattern of a new Parliamentary line-up on the subject of planning and controls, which is perhaps nowhere thrown into clearer relief than in respect of the nation's electricity.

I use that phrase "the nation's electricity" deliberately, for in whatever form the ownership of electricity supply is vested we have had all too painful a demonstration in recent weeks how large a part of the nation's industry and commerce depends upon it; and only a political extremist or half-wit would deny that the fundamental and overriding purpose of the generating plant and the supply and utilization network is the service of the nation. When general consent to that proposition has been obtained, however, a vast field for controversy is still wide open, and it is in that field that political definitions and attitudes are now taking new shape, as much in the committee rooms and lobbies at Westminster as in the Chamber itself.

Supervision and Enterprise

To indicate in a phrase the boundaries of this field of controversy I would say it is the reconciliation of effective oversight at the centre with vigorous enterprise from there to the periphery. To quote again from Mr. Butler, "we want far better and stronger central policy, and much less interference with the individual at the circumference." This has of course long been a problem for all industrial organizations numbering more than a few hundred employees, including many outstanding companies in the electrical industries, and the issue, which in essence is only one of management, is only now assuming political importance because the State is taking upon itself the functions of top management in some of the most vital sections of the nation's economy. In a sense the amateur is in control: yet, for the sake of the nation's health, we cannot allow the amateur to fail.

An odd position for an Opposition, yet one which is being faced, in the main, clearly and with courage. When the report of Mr. Butler's committee appears, probably towards the end of next month, it may go a long way towards proving those words. In the meantime it is of profit to examine in terms of electricity how the problem is being tackled in the House. Going back to the debate on the economic situation we have a striking demonstration of the need for central co-ordination—and indeed of the failure to exercise it. Other examples may easily be drawn from this debate, but I want to take the one that most closely concerns the electrical industries.

A Too-Successful Drive

Sir Stafford Cripps referred to the immediately post-war drive for the production of electrical appliances. As Minister of Aircraft Production he was asked to facilitate the turnover of aircraft accessory factories to this purpose. "That type of manufacture," he said, almost ruefully, "is very easily started and developed. As a result of those plans one of the first civilian industries that greatly increased its production was that of electrical and gas household appliances." Not merely that; but it was also the subject of a publicly-expressed elation by members of the Government at the time, as was pointed out later in the debate by Mr. Oliver Lyttelton.

Now the striking fact is that members of the Government knew very well at that time that six years of war had brought the country's generating capacity to a critically low level. They knew that coal stocks were dangerously low and that the output of the mines was decreasing. They knew that in the period of reconstruction and drive for export trade, industry would need all the coal and electric power it could get. Yet that moment was chosen to inflate the output of domestic equipment and ask for the nation's commendation.

The Opposition recognizes the need for key controls and overall strategic plans, and

it asks that Ministers should meet it and at the same time allow scope for responsible initiative inside the agreed framework; and in asking that it needs invoke no such mystical imponderables as industrial democracy but merely the need for managerial efficiency at all levels. This has been brought sharply into focus by the discussions of the Standing Committee on the Electricity Bill, which in recent meetings has been discussing two important clauses: that which empowers the Minister to give directions to the Central Authority in matters "affecting the national interest"; and the functions and powers of the Consultative Councils to be established in each area.

The Minister's Powers

One thing that emerged very clearly from the discussion on the first point was the strong measure of agreement between Socialist and Conservatives on the need for overall supervision without tiresome interference. On the whole the Opposition speakers were more emphatic on the second point. Mr. H. V. A. Raikes, for example, summarizing the Minister, said his intention appeared to be to confine himself to strategical considerations in regard to generating stations, to the question, possibly, of policy in distressed areas, and at the same time to have a free hand to indicate certain new fields of research.

"I do not complain of this at all," he added, "and the only point I wish to make is that I think the present clause is a shade wider than is actually needed on the Minister's own definition of what he requires to do. It is a very wide clause indeed. The words are: 'The Minister may give directions in relation to matters appearing to the Minister to affect the national interest.' The Minister has made it plain that he does not want to interfere with ordinary small matters, but the word 'affecting' drags in practically anything." After the same point had been made with more or less emphasis by other speakers, Mr. Shinwell accepted an amendment which narrowed the scope of the clause.

Similarly in the discussion on Consultative Councils, it is surely worthy of comment that after an opening by Colonel Walter Elliot, the Minister conceded that he had "made out a better case for the Consultative Councils than I could have hoped to have done myself." The issue here was how to vest as much autonomous responsibility in these area bodies as possible and to make them fully effective as expressions of local opinion. This time however the Opposition speakers believed too narrow a view had been taken by the Minister in that the work of the Consultative Councils would become too congested for them to carry it out satisfactorily.

As Colonel R. S. Clarke pointed out, the Councils were to be asked to perform three functions. "They have got to consider representations made to them by consumers in their area regarding the distribution of electricity, the variation of tariffs, the provision of new or improved services within the area and, I think, probably preferences in supply, which are going to be the most important thing. Then they have got to consider any matter which, apart from any representations, appears to them to be one to which consideration ought to be given. Then they have got to consider matters referred to them by the Boards which they serve."

It was the Conservative view that it was not possible for one Council to carry out effectively all three functions, and in proposing amendments to set up more adequate machinery they were concerned primarily with giving the Socialist legislation the best chance of achieving success. This in itself shows how concerned are all members with this problem of the decentralization of authority. I believe that the discussions of this Committee, carried on away from the limelight of the Chamber, will come often to be quoted in future works on the structure and management of publicly owned industries as being an important period in the formulation of opinion and the laying down of the main principles of operation.

At the E.D.A. luncheon (see page 471) Lord Brabazon envisaged a "Unitherm" as the issue of a possible gas-electric union. Our artist has depicted this horrible hybrid with its more or less proud parents

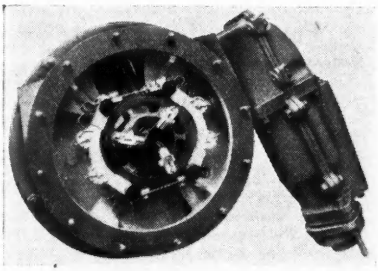
RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Mine Motors

HEAVY-DUTY motors specially developed for colliery use by the ENGLISH ELECTRIC CO., LTD., Stafford, include the "LD" range of squirrel-cage design while those designated "LDS" may have slip-rings in a flameproof enclosure.

The ventilated drip-proof design is protected,



Typical colliery motor with cover of slip-ring box removed to show brush gear

up to 15 degrees from the vertical, without additional louvres or canopies. The centre height, which is always a vital consideration in respect of colliery plant, is kept to the lowest possible and the 0·40 per cent carbon steel shafts are of extra large diameter. The terminal box can be fitted to either side of the motor and cables can be brought in either upward or downward. This line primarily consists of machines with from 4 to 16 poles. The slip-ring motors can have, if required, flameproof slip-ring gear with the Buxton certificate.

The standard range up to 650 V is from 80 to 900 HP at 1,500 r.p.m. (synchronous speed) and 20 to 215 HP at 375 r.p.m. Machines having numbers of poles between these figures, have corresponding ranges of outputs.

Current Regulator for Welders

Arc welders in shipyards and on other constructional sites often have to work at considerable distances from the current regulator associated with a.c. transformer equipment. To obviate this inconvenience the QUASI-ARC CO., LTD., Bilston, Staffs., has introduced the RMR. 300 regulator which can be controlled remotely by means of a light three-core cable terminating in a small switch that can easily be carried about by the operator.

There are two press buttons in the hand-switch for actuating an a.c. motor, which moves the core of the regulator, so providing a range of from 75 to 300 A in 20 seconds.

The motor is energized from the secondary winding of the welding transformer, which has a continuous rating of 18 kVA at 100 V for 3, 6, or 12 operators. The regulator is oil cooled, weighs 645 lb and is 21·5 by 31 by 37 in. high.

Iron-stand Combination

The cordless clothes iron being made by J. & H. WALTER, LTD., Farm Lane, Fulham, London, S.W.6, is designed for use in conjunction with a special ironing board which receives the iron in a channel, incorporating contact plugs for periodical re-heating. A noteworthy feature is that, when not in use, the iron may be locked to the stand so that the board can be folded up and put away with the iron securely held in position. The height of the stand is 32 in. above the floor, its ironing length being 34·5 in. and width 10·5 in. The iron alone weighs 5 lb and is available for three a.c. voltage ranges. Both iron and board are finished in pastel shades.

Modern Porringer

To the range of household appliances made by the ERALITE MANUFACTURING CO., LTD., 194, The Broadway, Wimbledon, London, S.W.19, there has been added a "cuisiniere" or double saucepan. The outer case is a black plastic moulding into which is fitted an anodized, spun aluminium liner together with a 750-W

Non-burning "cuisiniere" food heater

ring element, all completely insulated from the outer casing to enable the device to be used on the sideboard or dining table.

The removable food pan is also made of spun aluminium, with a moulded lid and handle, which is interchangeable with a three-compartment egg poacher that fits into the lower water pan.

A 2·5-MV Surge Generator

WITH increasing transmission voltages surge conditions tend to resemble more nearly those of lightning. For investigating this kind of phenomena and for testing insulating materials, the surge generator at Witton high-voltage laboratory of the General Electric Co., Ltd., has been doubled in output and can now generate 2·5 MV with a stored energy of 40,000 watt-seconds.

The generator consists of four columns, each comprising four interspaced condenser units, between which are connected the wave control and charging resistances and the interstage sphere gaps. Each unit has a maximum charging voltage of 160,000 and a capacitance of 0·2 μF.

A modified Marx circuit incorporates a damping resistance in each stage, thus more effectively preventing spurious high-frequency oscillations from appearing on the peak of the output-voltage wave.

The standard voltage wave shape is 1–50 microseconds, i.e., the voltage rises to its peak value in 1 microsecond, and falls to one half that value in 50 microseconds. Waves of 1–5, 1–10 and 10–20 microseconds can be produced by clipping in appropriate tail resistances.

The interstage spark-gap settings, up to 7 cm. per stage, which control the output voltage, are adjusted from a distance by a low-geared motor drive.

The generator can be used also for heavy surge-current tests by connecting the sixteen condenser units with 2, 4, 8 or 16 stages paralleled. Surge currents up to 90,000 A have been recorded.

Portable Welders for Iraq

DEPARTURE from the usual practice of employing d.c. for welding in the field is exemplified in six self-contained transportable generating units supplied by the Associated Equipment Co., Ltd., for providing a.c. for multi-operator equipment. They are to be used in the Iraq oilfields for such work as the erection of welded-steel oil-storage tanks and jointing pipe-lines.

The six-cylinder 1,500-r.p.m. oil engines have a continuous rating of 100 B.H.P. (overload 110 B.H.P.). A C.A.V. centrifugal governor is incorporated in the fuel-injection pump. Cooling is by a tropical-type radiator with oil-cooling element. Fuel consumption is 4¾ gal. per hr at full load. All working parts are interchangeable with those of engines fitted to 78 A.E.C. six-wheel tractors now being delivered to the same company.

Each engine is directly coupled to a Crompton-Parkinson three-phase 50-cycle 380/220-V pipe-ventilated alternator, capable of dealing with 50 per cent out-of-balance currents and having a continuous output of 63 kW or 105 kVA at 0·6 power factor. The alternator output is controlled by a Metropolitan-Vickers weather-proof sheet-steel switch cubicle, which also incorporates a delta-interconnected-star transformer to give a four-wire supply for 300-A single-phase 100-V arc welders, provided with 16·5-kVA capacitors for power-factor correction. When giving supplies for power and lighting, the alternator voltage is controlled by a M.V. carbon-pile automatic voltage regulator, the welding transformer then being disconnected. The sets are mounted on fabricated steel bed-plates together with 55 gal. fuel tanks, starter batteries and exhaust silencer.

Forthcoming Events

Monday, March 31st.—LONDON.—Institution of Electrical Engineers, 5.30 p.m. Informal meeting. Discussion on "Developments in Fractional-horse-power Motors," opened by A. N. D. Kerr.

NEWCASTLE-ON-TYNE.—Royal Station Hotel, 6.15 p.m. I.E.E. North-Eastern Centre. Annual general meeting and conversazione.

Tuesday, April 1st.—CAMBRIDGE.—Cavendish Laboratory, 6.30 p.m. I.E.E. Cambridge Radio Group. "The Pulse Testing of Wide-Band Networks," by D. C. Espley, E. C. Cherry and M. M. Levy.

LEEDS.—Corporation Electricity Department, Whitehall Road, 6 p.m. I.E.E. North Midland Installations Group. "Modern Electric Lift Practice," by L. S. Atkinson.

MANCHESTER. — Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Installations Group. "Coreless Induction Furnaces," by M. J. Marchbanks.

Wednesday, April 2nd.—MIDDLESBROUGH.—Cleveland Scientific and Technical Institute, 6 p.m. I.E.E. Tees-side Sub-Centre. "Commercial Development of Electricity Supply as a Consumer Service," by C. T. Melling.

RENFREW.—Association of Mining Electrical and Mechanical Engineers (West of Scotland Branch). Visit to works of Scottish Cables, Ltd.

BIRMINGHAM.—James Watt Institute.—Great Charles Street, 6.30 p.m. Junior Institution of Engineers (Midland Section). "Some Aspects of the Physics and Testing of Electrical Sheet Steels," by N. F. Astbury.

Saturday, April 5th.—LEEDS.—Hotel Metropole, 3 p.m. Association of Mining Electrical and Mechanical Engineers (Yorkshire North-West Branch). Annual general meeting.

Tuesday, April 8th.—Corporation Electricity Showrooms, Whitechapel, 6 p.m. Illuminating Engineering Society (Liverpool Centre). "Street Lighting," by J. M. Waldram.

Wednesday, April 9th to 12th. — LONDON.—Imperial College of Science and Technology, South Kensington.—Physical Society. Annual exhibition of scientific instruments and apparatus.

D.C. *versus* A.C. Transmission

Some Comments on a C.I.G.R.E. Paper

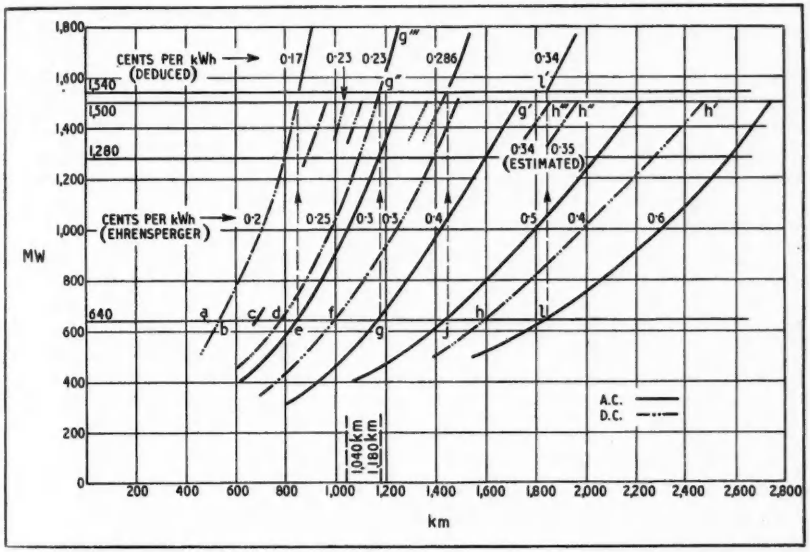
By A. M. Taylor, M.I.E.E.

WITH reference to recent comments in the *Electrical Review* relating to d.c. transmission, I would refer to a paper read by C. Ehrensperger at the C.I.G.R.E. meeting held last June. The accompanying diagram reproduces some of his curves, which, for convenience, I have marked b, c, d, e, f, g, h, j, l (a is omitted). The horizontal distances between a–b, c–d, e–f and g–h steadily and rapidly increase along the 640-MW line (a, c, e, g, being for a.c. and b, d, f, h, for d.c.).

The inference is correctly drawn by the author from his data that the distance that can be fed, for equal cost per kWh delivered, runs up very rapidly in favour of d.c. after 500 km is reached. He does not, however, state the MW taken for the limit with transient stability for a particular length of line, or whether the line is compensated or non-compensated (presumably the latter) or the voltage at which he assumes the a.c. line is working. When this paper was prepared probably not more than 180 MW would have been postulated for 650 km and 220 kV with "uncompensated" lines, if even that. Hoard's paper, read in August before the A.I.E.E., showed that some 334 MW could be transmitted at 230 kV over 650 km using "compensated" lines and the present writer has in hand proposals which he anticipates will raise the power to say, 440 MW (i.e. by 2·4 times).

Neither the limit of power fixed by Ehrensperger for the d.c. system for 650 km, nor the voltage, nor the momentary increments postulated, nor their suddenness is known. The question therefore arises as to whether the increments a–b, c–d, e–f and g–h do steadily go up in favour of d.c. if he has taken a figure for the transient stability limit for a.c. that is much too low.

Taking Ehrensperger's d.c. figures as correct, as regards the power that can be put through, we may consider point g, at 640 MW transmitted, on his a.c. 0·4 cents-



Comparative costs of a.c. and d.c. transmission allowing for transient stability

per-kWh curve g–g′ (640 being arbitrary). I have extended his curve slightly upwards. If he has under-estimated the a.c. power by 60 per cent (as I believe), then, keeping the distance unaltered at 1,180 km, we get a new point g″, at 1,540 MW as the output for a.c., through which we can draw a curve (g‴g″) similar in configuration to adjoining curves, and we can take $\frac{1}{2{\cdot}4}$ times the cost per kWh taken for the g curve, making it 0·166 cent per kWh.

Since the power is to be 2·4 times (ignoring the costs of compensatory devices, if any, and, for the moment, of additional generators and transformers) the kWh delivered is 2·4 times greater. As regards the line, the charge per kWh delivered (except for the additional copper), will be 60 per cent lower than that taken in the paper referred to. The cost in cents per kWh deduced, in place of the original figure of 0·40, is 0·23, which is 38 per cent higher than if we had merely divided by 2·4.

Draw in through the point (g″) a piece of curve (g‴ g″) more or less parallel with (dg″), the curve for d.c. working at 0·25 cents per kWh. With a.c., at 1,180 km the expense of working is then the same as with d.c. at 1,040 km. In other words, a.c. does 140 more km than d.c.—the reverse of Ehrensperger's finding. Even at 1,900 km the costs are nearly alike—(compare (1′) and (h‴)). This, if correct, means that d.c. will not supersede a.c. up to 1,600 km at least. It is thus important that the true limit imposed by transient stability should be taken for the most favourable conditions of compensation (i.e., with lines compensated by series capacitors) when comparing d.c. and a.c. working. The curves herewith are not put forward as being in any way authoritative, but merely as a first attempt to show the effect of under-estimating the amount of power that can be passed, with a.c., without losing stability.

If the kWh put through the line is doubled, the cost per kWh will not, of course, be halved. I have therefore increased the halved value by a factor (1·38) that takes account of those charges (e.g., interest and sinking fund on generators, etc.) which are not halved when the kWh is doubled and which may prove to be insufficient, but the prime point of these notes is to draw attention to the importance of correctly assessing the stability—limit value, etc., of MW transmitted. It would be interesting to know how the advocates of d.c. transmission would deal with a system such as the Montana group of rolling mills in the United States or even with railway peaks.

Australian Notes

From Our Correspondent

REVIEWING the growth of the electricity supply of Perth recently, Mr. W. H. Taylor, general manager of the Western Australian State Electricity Commission, stated that in 1914 the output of electricity was only five million kWh, whereas it was now more than 96 million. Output at Fremantle had grown from three to 23 million kWh with a tramway output of 13 million. During the first year of operation the East Perth generating station had an output of 10 million kWh, whereas last year it had one of 187 million.

The Western Australian Government Statistician reports that for the year 1946 the amount of electricity generated was 186·6 million kWh and total sales 159 million kWh.

The Electricity Trust of South Australia has decided that June 1st shall be "settlement day," when shareholders in the Adelaide Electric Supply Co., Ltd., may take their 4 per cent debentures in the Trust or their compensation from the State Government.

Mr. J. R. Coomber, managing director of Vactric Electric Appliances, Ltd., Finsbury, South Australia, states that the Minister for Immigration has informed him that it may soon be possible to arrange for the bringing out from Scotland fifty female specialists required for the training of local personnel.

Electricity Meter & Allied Industries, Ltd., which some time ago took over the Commonwealth munitions factory at Orange (New South Wales) hopes eventually to employ there at least 1,000 persons. The factory is to manufacture electric motors, refrigerators and washing machines. Total floor space is 300,000 sq ft, all on one level.

The Prime Minister (Mr. Chifley) stated recently that officers of the Customs and Commerce Departments are now reviewing the Australian tariff schedules and the tariffs of the principal countries with which Australia trades, in preparation for the forthcoming international trade conference. It is expected that Australia will come under strong pressure from many of these countries and that many tariff concessions will be sought. There have been no major tariff changes in Australia since before the war, when tariffs were based on the general principles of the Ottawa Agreement.

Overseas Electrical Trade

Generating Plant Exports Continue to Rise

DECREASES both in imports and exports of electrical equipment in February as compared with the previous month are more than accounted for by the fact that there were three fewer working days. Exports were just over £500,000 down at £4,921,322, which was, however, nearly £2 million higher than the total for February last year and over £3 million above the monthly average for 1938.

Despite the shorter month January's striking generator export figures have been substantially surpassed, and while shipments of complete units have advanced from £507,303 to £554,260, exports of generator parts have jumped from £36,819 to no less than £237,244. South Africa was the largest purchaser, taking £195,932 worth, while Russia and India accounted for £99,043 and £82,481 worth respectively.

Exports of submarine telegraph and telephone wires and cables rose from £180,87[illegible] to £219,122, but there was a marked decline in the other wire and cable classifications, from £744,334 to £586,438. Nevertheless the total for the whole class was over three

Table I.—Electrical Exports and Imports

Class	Exports			Imports		
	Feb., 1947	Feb., 1946	Monthly Av., 1938	Feb., 1947	Feb., 1946	Monthly Av., 1938
	£	£	£	£	£	£
Telegraph and telephone wires and cables, submarine	40,382	15,343	17,289			
Ditto, not submarine	178,740	104,697	71,803	6,582	9	31,246
Wires and cables, other than telegraph and telephone, rubber insulated	297,858	203,751	117,533			
Ditto, insulation other than rubber	288,580	291,197	153,256			
Commercial radio apparatus	85,398	35,643	28,296	15,543	*	*
Domestic radio receivers	360,587	97,518	36,755	6,089	7,514	10,148
Telegraph, telephone and signalling apparatus	†560,945	345 512	242,716	2,330	75	9,243
Other radio, etc., apparatus	184,494	98,005	57,848	4,596	759,714	47,870
Valves	104,918	81,279	41,272	19,573	38,700	10,893
Electric carbons, furnace	*	*	*	25,359	1,320	4,054
Other electric carbons	*	*	*	2,917	5 137	2,301
Electric lamps	86,516	115,192	49,440	3,343	53	10,265
Other lighting apparatus	189,363	128,221	48,565	4,307	584	38,662
Primary batteries	34,569	37,206	13,572	1,239	23	3,549
Accumulators, portable	108,945	75,306	28,874	*		
Ditto, stationary	25,908	4,602	19,773	*		
Ditto, parts and accessories	47,555	55,113	—	*		
Electric cooking and heating apparatus	186,273	68,715	30,664	*		
Commercial electrical instruments, including ammeters, voltmeters, etc., and parts	61,601	36,201	15,878			
House service meters	52,445	35,656	15,791	11,968	16,375	32,057
Other electrical instruments	28,114	34,898	9,612			
Electro-medical apparatus, other than X-ray	9,660	6,763	3,038	*		
X-ray apparatus, vacuum tubes and parts	34,741	21,905	4,881	7,857	6,692	9,734
Insulating materials, not elsewhere specified	92,481	81,498	19,343	*		
Unclassified electrical goods and apparatus	152,182	206,721	108,083	16,970	14,225	52,980
Generators, complete, up to 200 kW	117,019	31,309	38,071	*		
Ditto, over 200 kW	437,241	19,968	119,079	*		
Ditto, parts	237,244	45,073	—	*		
Railway and tramway motors	36,512	15,628	15,977			
Other motors up to ½ H.P.	28,575	11,459	9,001			
Ditto, over ½ H.P. but under 1 H.P.	13,084	8,456	2,470	18,168	11,611	40,488
Ditto, 1-250 H.P.	219,736	167,064	96,637			
Ditto, over 250 H.P.	23 471	16,943	20,960			
Converting machinery	1,043	630	101,304	*		
Transformers, including coils	190,307	159,259				
Rectifiers for power-house use	14,493	4,991	3,463	*		
Motor starting and controlling gear	63,959	57,666	50,866	*		
Switchgear and switchboards, other than telegraph or telephone	173,724	157,972	184,533	*		
Other electrical machinery	15,982	39,869	15,497			
Electric vacuum cleaners and parts	121,364	28,015	26,662	*		
Other electrically-operated portable appliances	15,313	21,308	10,394	6,424	1,197	24,627
Total	4,921,322	2,966,552	1,829,196	153,265	863,229	328,117

* Not classified separately.

† The figures for 1947 are not completely comparable with those for previous years.

times the monthly average for 1938. In the radio, telecommunications and electronic apparatus section the best item was telegraph and telephone equipment (£560,945), which was £72,169 more than in January and well over twice the pre-war figure. Other radio classifications maintained their encouraging positions, with domestic radio figuring prominently at £360,587, almost exactly ten times the 1938 monthly average. Nearly one-third of the radio sets went to India.

Exports of motors continued at about the same rate, with units of from 1 to 250 H.P.

Table II.—Distribution of Exports of Electrical Goods and Apparatus

Destination	Feb., 1947	Feb., 1946	Monthly Av., 1938
Eire	204,021	96,807	37,726
Channel Islands	23,209	24,471	12,177
Palestine	80,214	78,424	8,426
British West Africa	49,136	40,921	12,889
Union of South Africa	302,867	358,376	162,584
Southern Rhodesia	26,938	23,700	9,632
British East Africa	14,469	16,134	7,893
British India	478,381	322,889	123,789
Burma	55,881	3,596	5,337
British Malaya	180,633	8,221	32,792
Ceylon	31,892	7,704	15,048
Hong Kong	41,463	2,625	12,939
Australia	173,783	143,250	197,366
New Zealand	147,185	158,146	96,225
Canada	27,556	6,679	12,547
British West Indies	29,719	27,416	12,954
Other British Countries	60,585	65,708	21,265
Soviet Union	2,428	—	36,781
Finland	5,206	19,354	5,969
Sweden	83,537	38,396	14,948
Norway	88,488	50,043	12,881
Iceland	31,237	32,208	2,796
Denmark	88,082	20,908	18,907
Poland	1,649	30,830	9,702
Netherlands	66,590	48,352	22,010
Belgium	102,251	70,474	11,208
France	31,795	50,816	16,082
Switzerland	32,368	13,983	3,768
Portugal	35,428	78,525	6,512
Spain	13,881	56,942	3,813
Czechoslovakia	19,965	173	7,256
Jugoslavia	10,867	—	1,475
Greece	38,653	3,349	4,926
Turkey	43,941	2,824	7,684
Portuguese East Africa	6,017	2,503	6,942
Egypt	74,085	72,163	13,176
Iraq	46,986	10,351	5,530
Iran	43,644	20,175	16,345
China	153,211	3,660	4,119
United States of America	10,400	8,714	5,839
Mexico	4,458	592	1,466
Venezuela	40,042	1,514	2,936
Chile	20,861	1,300	6,635
Brazil	13,341	9,143	11,164
Argentine Republic	23,795	37,087	45,452
Other Foreign Countries	151,117	111,496	46,371
Total	3,212,255	2,180,742	1,134,282

accounting for £219,736 of the total of £321,378, which is over half as much again as in February, 1946, and over twice as much as before the war. South Africa and India took £88,646 and £83,234 worth respectively. The figure for switchgear (£173,724), while slightly higher than that for February, 1946, is £10,809 less than the monthly average for 1938 and £157,821 lower than in January.

For goods and apparatus purchases British India easily took first place with a share valued at £478,381, with South Africa (£302,867), Eire (£204,021), British Malaya (£180,633), Australia (£173,783), China (£153,211) and New Zealand (£147,185) following.

Electrical imports in February were less than half the pre-war monthly average (by values) but there was a greater contrast between them and the value recorded for February last year—about £147,000 against £862,000. This was almost entirely accounted for by the big fall in imports of radio-communication and navigational aid apparatus from about £760,000 to £20,000. There were rises of no great significance in cables and telegraph and telephone equipment. The only noteworthy increase occurred in the case of furnace carbons, but although these were well above the average pre-war monthly value their number fell from 23,667 to 6,352.

Coopers Hill Prize

THE 1946 triennial award of the Coopers Hill War Memorial Prize and Medal fell to the Council of the Institution of Electrical Engineers which invited members to submit for consideration a paper on any subject coming within the scope of electrical science or electrical engineering and their applications. The Council has decided that the award shall not be made for a further year to give greater opportunity for the submission of papers. Papers submitted must be specially written for the purpose and reach the Secretary of the Institution not later than September 1st, 1947. Only corporate members who were under 35 years of age on January 1st, 1946, are eligible. All papers submitted will also be considered with a view to publication in the *Journal*. Any papers accepted for that purpose will be eligible for consideration in connection with the ordinary premiums awarded by the Council.

Easter Holiday Wages

The National Federated Electrical Association has issued to its members a schedule of holidays over the Easter period prescribed in the national and local working rules. The national working rules provide that all hours worked on Easter Monday shall be paid for at the rate of time and a half. The schedule sets out the districts in which the local working rules prescribe that time and a half must be paid for all hours worked on Good Friday, the following day and the Tuesday after Easter Monday.

COMMERCE and INDUSTRY

I.M.E.A. Convention Arrangements. Juvenile Employment.

WHILE present-day conditions will restrict the numbers at some of the functions, it is hoped that the annual convention of the Incorporated Municipal Electrical Association at Bournemouth (June 23rd-27th) will approach the standard of pre-war conventions. The banquet and ball will be held at the Pavilion on June 27th and will be limited to 600. It is expected that the programme will be circulated early in May and formal invitations will be dispatched during that month. Members are asked to notify the secretary of their wishes as early as possible.

Census of Production Postponed

Mr. John Belcher, Parliamentary Secretary of the Board of Trade, announced in the House of Commons last week that the Government had decided to take a full Census of Production in 1949 in respect of 1948. It had been originally planned to take a Census in respect of 1947, but it was realized that this year was proving a particularly difficult one for manufacturers, and the Government did not wish to add to their troubles.

The partial Census for 1946 is not affected Those manufacturers who have not yet completed their returns for it should therefore do so as soon as possible, so that the results of this Census may be available in good time. They are urgently needed not only because of the light they will throw on the industries affected, but also for the guidance they can give in the preparation of the schedules for the 1948 Census of Production, which it is hoped will be issued.

Floating Exhibition

The first post-war floating exhibition is due to sail for South American ports at the beginning of next month. The exhibition, which has been organized by a number of British industrial concerns in conjunction with the South American Saint Line, Ltd., is being mounted in one of the holds of the 9,500-ton M.V. *St. Merriel*, and comprises fifty exhibits. Among the concerns who are exhibiting are British Oil Engines (Export), Ltd., Brush Electrical Engineering Co., Ltd., Enfield Cables, Ltd., Enfield Rolling Mills, Ltd., the Plessey Co., Ltd., Vandon-Murray, Ltd., and Relco, Ltd., (Export Division of Elexcel, Ltd.). Among the ports of call will be Buenos Aires, Rio de Janeiro, Santos, Montevideo and Rosario. The *St. Merriel* will remain at each of these ports for three or four days, during which the exhibition will be open to visitors holding invitations from the exhibitors' agents in South America.

Showroom Fluorescent Lighting

The accompanying illustration shows the tailoring and showroom premises of Gieves, Ltd., 27, Old Bond Street, London, W.1, Naval, Air Force and civilian outfitters, at whose request an installation of " Sieray " fluorescent lighting was planned and supervised by Mr. Harold Cox, in conjunction with the Illuminating Engineering Department of Siemens Electric Lamps & Supplies, Ltd. Special fittings were designed for the showroom, which occupies the whole of the ground floor from Bond Street to Albemarle Street, the fittings each being arranged for the operation of three " Sieray " 80-W fluorescent tubular lamps. Industrial fittings equipped with 80-W " daylight " lamps are employed for the tailoring and office sections, in which there are approximately 200 lighting points. The whole of the installation work was carried out by Rashleigh Phipps & Co., Ltd.

" Sieray " fluorescent lighting in a Bond Street showroom

B.S. for Copper Conductors

A revision of the British Standard for conductors for overhead power lines (B.S. 125) which was first published in 1924, has been issued as B.S. 125: 1947. It prescribes the standard values for the physical constants of hard-drawn copper and standard resistances, weights and sizes and mechanical properties for both solid and stranded conductors and

states requirements for the properties and testing of joints.

In the new edition the tables of secondary standard sizes are omitted and the number of primary sizes has been reduced in order to limit the number for general use.

A table of standard lay ratios has been added and Clause 14 dealing with stranding has been modified in order to bring the Specification into line with B.S. 837, which relates to steel-cored copper conductors for overhead transmission. As previously, international standards of resistance for copper are given in an appendix. Copies are obtainable from the British Standards Institution, 28, Victoria Street, London, S.W.1, at 2s. each net.

Hackbridge-Hewittic Amalgamation

The Hackbridge Electric Construction Co., Ltd., the Hewittic Electric Co., Ltd., and the New Switchgear Construction Co., Ltd., have for long been closely associated, and they have now been amalgamated. The amalgamated company, with a capital of £750,000, has taken over all the assets, liabilities and functions of the three companies; it is entitled the Hackbridge & Hewittic Electric Co., Ltd. The directors are continuing with the amalgamated company and all business will continue to be carried out in the same factories as hitherto and under the same management.

Russians Visit Reyrolle Works

A delegation from the U.S.S.R. which is on a visit to Britain toured the Hebburn Works of A. Reyrolle & Co., Ltd., on March 19th. They were welcomed by Mr. Harry Towers, director and general manager, who stated that Reyrolle's had been trading with the Soviet since 1931. The company had recently received a £100,000 order from Russia for 700 flameproof coal-mining type circuit breaker panels for Russian mines. Mr. N. Bazhan, expressing the delegation's thanks said that the name of Reyrolle was already well-known in Russia and his country would require still more of the company's equipment.

Electricity Not a Luxury

Miss Catherine Haslett, director of the Electrical Association for Women, speaking at Blackburn on March 19th, said it was unfair to penalize people who were progressive enough to introduce electricity in their homes. They could save fuel by extending the use of electricity. The standard of living of the housewife must not be lowered. Women were being asked to enter industry to help in production but if they had a nation of overtired women through the operation of old-fashioned methods they would be too overwrought to give this necessary help. If the Government wanted the service of women it must make electrical energy available to them, for if they had to run their homes in the old-fashioned way they would be too tired to hold the big jobs. In talking to Cabinet Ministers one got the impression that they regarded electricity as a luxury. Actually it was a vital necessity.

Reports on German Industry

Further reports on German industry have been published and a few copies are available from H.M. Stationery Office and the reports may be seen at a number of the leading libraries. They include the following:—B.I.O.S. 695, "The Design and Operation of German Telephone Exchange Equipment" (7s.); B.I.O.S. 866, "High-frequency Heating" (3s.); B.I.O.S. 980, "Electro-Acoustics in Germany" (1s.); B.I.O.S. 1035, "Electrostatic Separation of Coal and Other Minerals" (6s.); B.I.O.S. 1129, "The German Accumulator Industry" (5s. 6d.); F.I.A.T. 797, "The Electrolytic Chlorine Plant in Hoechst-on-Main" (5s. 6d.); and F.I.A.T. 865, Six papers on television (in German with English prefaces).

Price of Aluminium

The price of virgin aluminium in ingot or notch bar form has been increased from £72 15s. to £80 per long ton delivered into consumers' works. The new price will apply to metal of a purity of 99 per cent to 99·5 per cent inclusive, with premiums as follows for higher purities:—Minimum 99·6 per cent, £88; minimum 99·7 per cent, £92; minimum 99·8 per cent, £97; minimum 99·9 per cent, £130; minimum 99·99 per cent, £180.

Juvenile Employment

The National Juvenile Employment Council, appointed by the Minister of Labour and National Service to consider matters affecting the organization, procedure and development of the Juvenile Employment Service, held its first meeting at the Ministry of Labour on March 19th. The appointment of this Council, together with separate Advisory Committees for Scotland and Wales, was recommended in the report of a Committee on the Juvenile Employment Service under the chairmanship of Sir Godfrey Ince. The Committee defined the aim of the Juvenile Employment Service as being to provide a link between school and employment, its functions being (a) vocational guidance, (b) the placing of the juvenile in employment, and (c) follow-up and maintenance of contact throughout the period of adolescence.

It recommended the establishment of a Central Juvenile Employment Executive, to be staffed by officers of the Ministry of Labour and the Education Departments, to control policy and ensure uniform efficiency throughout the Service. This Executive has since been organized. It was also recommended that the Central Executive should have the help and guidance of a National Advisory Council linked with Scottish and Welsh Advisory Committees. These bodies have now been appointed.

Lord Morrison, chairman, National Council presided at the meeting and Mr. G. Isaacs, Minister of Labour, said that advice on careers and help in finding appropriate employment were not sufficient; juveniles should be properly trained and given opportunities to carry on their education while in jobs and this could only be done with the full co-operation of industry. While many sections of industry were alive to their responsibilities in this respect and had improved their training schemes and welfare conditions, others had been slower to respond. He looked to the industrial representatives on the Council to advise on the ways in which more rapid progress might be made.

Cost-of-Living Index

The Cost of Living Advisory Committee has recommended that the present cost-of-living index should be terminated and that as a temporary measure, until the results of further study and examination are available, an interim index of retail prices should be substituted at an early date. Mr. Isaacs, Minister of Labour, told the House of Commons last week that he had accepted the Committee's proposals.

British Firms in Australia

From the Australian Trade Commissioner we have received a list of British, American, Canadian and Indian firms which are establishing new industries in Australia or expanding existing branch plants. From this it is seen that the Telegraph Construction & Maintenance Co., Ltd., through A.W.A.-Telcon Pty., Ltd., is carrying out a £150,000 extension at its Sydney factory for the production of electric cables and rubber reclamation. British Oil Engines (Export), Ltd., and E.M.A.I.L. (through British Oil Engines, Australasia, Pty., Ltd.), is establishing a new works at Waterloo, N.S.W., for the manufacture of petrol, paraffin and oil engines.

Fleet Electrics, Ltd. (through Juno Electrics Pty., Ltd.) are putting up a new factory costing £10,000 for producing lawn mowers, vacuum cleaners, washing machines, etc., and vacuum cleaners and electric motors are also to be made at a new £300,000 works at Finsbury, South Australia, by Vactric Electrical Appliances, Ltd. Joseph Lucas (Aust.), Pty., Ltd., are to expend £250,000 on a works at Carlton, Victoria, for the production of electrical equipment. Lister-Blackstone Pty., Ltd., are to expand their existing factory for the manufacture of petrol and Diesel engines. The factory of the S.T.C. Co., Ltd. (International Telephone and Telegraph Corporation) at Villawood, N.S.W., which produces electrical appliances is to be extended.

A new £50,000 works is being opened at Rivervale, W.A., by Varley Dry Accumulators (Aust.) Pty., Ltd. The American-supported General Dry Batteries (Australasia), Ltd., is undertaking the production of dry batteries in South Melbourne.

Power Engineers' Sick Pay

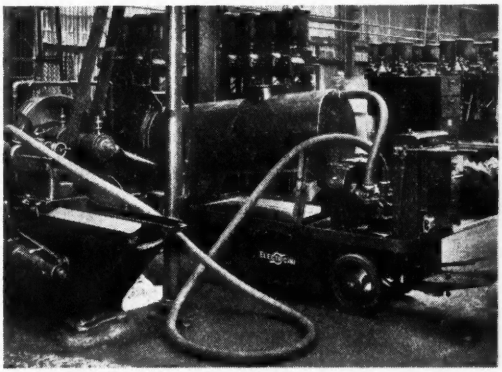
An agreement has been made by the National Joint Board of Employers and Members of Staff (Electricity Supply Industry) adopting a uniform system of payments to power station staff during sickness. These payments will be made on a rising scale according to length of service. For instance, a man with service not exceeding four months will be entitled to one month's full pay only; for service in excess of ten years the arrangement is for six months' full pay followed by six months' half pay. Methods of calculating the allowance and qualifying conditions are set out. The agreement came into operation on March 1st.

Electrical Machinery Traders

The second annual general meeting of the Association of Electrical Machinery Traders is to be held on April 29th at the Holborn Restaurant, London, W.C.1. It will be preceded in the morning by a Council meeting at which members may be present and luncheon arrangements are being made.

Machine Tool Maintenance

Machine-tool cutting coolant sumps need to be replenished occasionally and cleaned out and refilled periodically. To reduce labour wastage, a self-contained pumping equipment is now available from St. George's Engineers, Ltd., Manchester, 5. The equipment consists of a tank, and an electric motor-driven pump mounted on a Crompton Parkinson standard TU. 20 " Electricar " industrial truck. Both



Crompton Parkinson electric truck fitted with equipment for servicing machine tool pumps

the truck-driving motor and the pump motor are supplied from the one battery. The D.4 " Mono " pump is driven by a 1¼-B.H.P. 30-V Crompton Parkinson motor. At 1,450 r.p.m. the performance of the pump is: 1,125, 990 and 855 gallons per hour, against 50, 100 and 150 ft heads, respectively. In practice, the pump will empty an average tank of 10-15 gal. in five minutes. The tank capacity is about 100 gal.

Radio-Electrical Year Book

The 1947 edition of the " Trader " Year Book for the Radio and Electrical Trades (208 pp.) has been brought up to date in the light of the many recent changes in the industries. New features are complete receiver specifications, a mains voltage directory and an analysis of wireless licence figures. Other sections are directories of trade addresses, wholesalers and proprietary names, a classified buyers' guide, and a legal guide. The Year Book is obtainable at 10s. 6d. post free (with a reduction to subscribers to the *Wireless and Electrical Trader*) from the Trader Publishing Co., Ltd., Dorset House, Stamford Street, E.C.1.

Trade Publications

Ferranti, Ltd., Hollinwood, Lancs.—Illustrated and priced leaflets (IN.17D) describing a dual range clip-on ammeter and (IN.18C) 3·25-in. range of ammeters and voltmeters.

Runbaken Products, Ltd., 71, Oxford Road, Manchester, 1.—Illustrated and priced leaflets on " Easidun " and " Midget " electro-plating outfits, for the jewellery and similar trades.

Metway, Ltd., King Street, Brighton, 1, Sussex.—Illustrated price list (FF.15) of moulded terminal blocks and strips, bushes, rubber grommets, buffers and cable connectors.

Henry Wiggin & Co., Ltd., Wiggin Street, Birmingham, 16. Leaflet on the properties of " Nilo K " glass-to-metal sealing alloy of nickel-cobalt-iron composition, available in the forms of sheet, strip, rod, wire and tubing.

Resistance Welder Manufacturers

At the annual general meeting of the British Resistance Welding Machine Manufacturers (who form a Section of the B.E.A.M.A.) held in London last week, the retiring chairman (Mr. J. M. Sinclair, A.I. Electric Welding Machines, Ltd.), referred to the importance of resistance welding during the war and in many of our leading industries.

Whilst the resistance welding industry is small in output (the combined turnover of all manufacturers is about £1,250,000 per annum) it has exercised immense influence on production methods, resistance welding and design. The equipment produced in the United States has been found to be in no way superior to our own. Through their Association the manufacturers have organized a Technical Committee which has produced a system of rating resistance welding machines, now accepted as standard throughout the industry, and has prepared a booklet on electricity supply requirements for resistance welders.

Mr. R. W. Ayers (Sciaky Electric Welding Machines, Ltd.) was elected chairman for the year 1947-48, and in his address he pointed out that the use of resistance welding in Great Britain was by no means fully developed and considerable economies could be effected by wider and more effective use. Resistance welding effected enormous increases in output per man-hour and was playing a large part in improving the efficiency of Britain's metal working industries.

Mr. F. Simmons (British Federal Welder & Machine Co., Ltd.) was elected chairman of the Technical Committee and Mr. E. S. Waddington (Philips Industrial) chairman of the Trading Committee.

Trade Announcements

The British Aluminium Co., Ltd., and Alexander Brown & Co. announce that by mutual agreement the Scottish business of the British Aluminium Co. will be transacted through their own Scottish branch office to be opened in Glasgow as from July 1st next. Alexander Brown & Co. will be relinquishing the agency, but will continue to act as principal stockists in Scotland. The Scottish branch office of the British Aluminium Co. will be at the same address as Alexander Brown & Co., 113, West Regent Street, Glasgow, C.2.

The T.N.J. Electrical Engineering Co., Ltd., has moved its head office to 1, Dove Road, London, N.1, and its stores and works to 434, Essex Road, N.1 (telephone: Clissold 4423) and asks for manufacturers' catalogues of electrical goods.

E. H. Jones (Machine Tools), Ltd., have been appointed sole selling agents for the British Isles, excluding Scotland, of Eumuco mechanical forging equipment. The company will also handle export sales for India and Central European countries.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

" HILLMAN WARD " electric toaster.

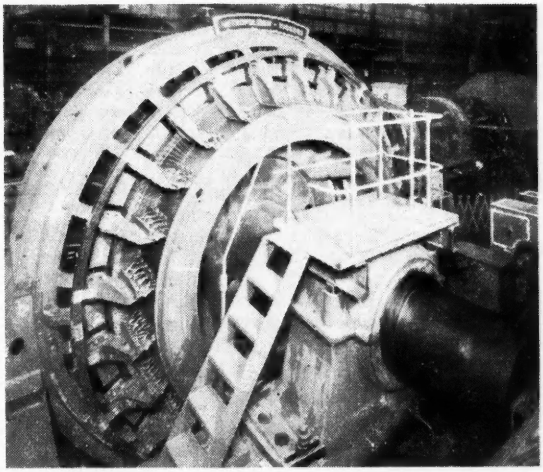
" WALES " or " WATES " convertor.

" REMO " fluorescent lighting fittings.

Progress in Manufacture—IV

Heavy Plant from the Metrovick Works

MANY of the orders accounting for the intense activity reported by **Metropolitan Vickers Electrical Co., Ltd.,** as in the case of other manufacturers recorded in the *Electrical Review* in recent weeks, have come from abroad. From the great variety of products the following items have been selected as representative of the heavier side of engineering. Generating plant ordered last year for grid operation included six turbo-alternators of about 50,000 kW each in addition to ten with an aggregate output of 540,000 kW under construction for all parts of the world, which were ordered in 1945. These form part of a total of more than sixty machines with an aggregate capacity of 2 million kVA now in hand. Five of the first group are three-cylinder 3,000-r.p.m. machines incorporating five-stage feed heating; two each for Poplar and Poole (Bournemouth Co.) will operate with steam conditions of 900 lb per sq. in. (gauge) and 900-925 deg F, and the one for the new Croydon station is for 600 lb and 825 deg F, as were its two predecessors ordered the previous year. The sixth set for Sheffield is to be a 1,500-r.p.m. two-cylinder machine. In addition a 30,000-kW, 3,000-r.p.m. set (with 33-kV alternator) has been ordered for Belfast (600 lb and 800 deg F).



Metrovick reversing rolling-mill motor (5,000/13,000/15,500 H.P., 55/120/140 r.p.m.)

Among a large batch for export are three 20,000-kW, single-cylinder, 3,000-r.p.m. turbo-alternators for Catalagzi, Turkey (to replace war-diverted plant) and two 1,000-kW pass-out and two 2,500-kW condensing units for the Kubra Textile Mill, Egypt, said to be the largest of its kind in the world. Two 25,000-kW pass-out sets were shipped to Russia for district heating; inlet steam conditions are 398 lb per sq. in. and 750 deg F and the pass-out pressure (333,000 lb per hr) is 85 to 114 lb per sq. in. The first of three 60,000-kW, two-pole, hydrogen-cooled alternators under construction should soon be ready for testing. One of the associated turbines will be supplied with steam at 1,235 lb. per sq in. and 825 deg F, which will be reheated after partial expansion. Two 50,000-kW, 1,500-r.p.m. sets for the new Pyrmont station, Sydney, will take steam at 1,200 lb per sq. in. and 925 deg F.

Water-wheel generators for overseas include three 33,333-kVA, 167-r.p.m. machines for the new Karapiro station of the New Zealand Government; weighing 330 tons apiece and 34 ft in overall diameter, they are said to be the largest of their kind built in Great Britain. Other vertical-shaft machines, ranging from 17,150 to 40,000 kVA and from 75 to 600 r.p.m. are going through the shops for Finland, Portugal, India and Australia. Horizontal-shaft machines include three of 32,000 kVA at 428 r.p.m. Two 6,950-kVA, 167-r.p.m. alternators are being made for the Pitlochry station of the North of Scotland Hydro-Electric Board. Propulsion schemes in hand for land and marine use is a gas-turbo-electric locomotive for the Great Western Railway (see *Electrical Review*, January 24th, page 166).

Among 190,000 kVA of salient-pole synchronous condensers under construction (mostly with automatic excitation control) are four of 30,000 kVA at 1,000 r.p.m. for Russia and two of 20,000 kVA (same speed) for the Victoria Falls Power Co. Nearing completion is a 31,250-kVA, 40/50-cycle, 600-r.p.m. frequency changer for the Western Australian Government. Orders have been received for nearly 100,000 H.P. of large induction and synchronous-induction motors. In addition to motors for a.c. geared winders and for Ward-Leonard sets of winders and rolling mills the field covered includes the driving of flour mills, mine fans, pumps and line shafting.

Transformers in hand of 60,000 kVA or thereabouts include the first four to step up direct from generating to grid voltage (Croydon and Poplar) and four others for 66 kV or 132 kV. Among overseas orders are eleven units of between 20 and 40 kVA for Perth (Western Australia), Turkey, Finland and Spain. Of outstanding importance was an order for a 220/150-kV, 100-MVA, three-phase bank with fully insulated neutrals and 30-MV tertiary winding for interconnecting the Dutch and German systems.

Reactors for the Grid

Two 132-kV banks of coreless copper-shielded reactors (18 per cent of 90 MVA feeder capacity) have been ordered by the Central Electricity Board. Five 191-kVA arc-suppression coils for the 33-kV system in Tanganyika and one of 3,710 kVA at 121 kV for Russia are further items. Flame-proof colliery transformers are being applied to oil refineries and several 200-kVA units are to be sent to South America. A 24-VA intrinsically safe bell transformer has been designed for mining use.

Air-blast switchgear (incorporating metallic resistors) in hand includes 220- and 120-kV breakers for Finland, 66-kV for Turkey and 66- and 165-kV for Portugal, in addition to fourteen for 132 kV for the Cliff Quay C.E.B. substation at Ipswich. Oil circuit breakers up to 110 kV and 1,500 MVA are being shipped in large numbers to South Africa, Australia and New Zealand, and further orders are reported for single-break gear, of which one example is designed for the Cossipore station at Calcutta. Contracts for draw-out switchgear have been substantial for home and overseas distribution networks.

A big demand for d.c. motors is due to activity in the shipbuilding, wire-drawing, steel and paper industries and also to the adoption of unified boiler control in several British power stations. Drives for looms are among those that have called for a heavy output of a.c. motors and control gear. Electronic control is being applied to an increasing number of industrial uses.

Work is proceeding on twenty-eight six-axle, 3,000-V, 2,500-H.P. (one hour rating) electric locomotives for mixed traffic in the Transvaal. Multiple-unit equipment is being supplied to Sydney, Brazil and South Africa. Trolley-bus equipments are being made for New Zealand and Norway and for nine British towns, and tramway equipments for Glasgow, Sheffield and Lisbon.

Rhodesian Electrical Imports

THE accompanying table gives the official figures of imports of electrical goods into Southern Rhodesia in 1945, with notes of increases or decreases on 1944.

Class of Equipment and Country of Origin	1945 £	Inc. or dec. on 1944 £
Electric cable and wire	116,400	+ 29,100
From United Kingdom ..	47,700	− 32,000
„ Canada	17,500	+ 17,500
„ South Africa	50,500	+ 43,600
„ United States	600	− 100
Lamps	17,600	− 8,400
From United Kingdom ..	14,200	− 10,300
„ Canada	800	+ 400
„ United States	2,600	+ 1,400
Telegraph and telephone material and instruments	24,900	+ 9,600
From United Kingdom ..	24,500	+ 10,600
„ United States	400	—
Radio material	32,400	+ 20,100
From United Kingdom ..	11,600	+ 4,600
„ South Africa	12,000	+ 12,000
„ United States	8,100	+ 3,300
Heating and cooking apparatus ..	17,400	+ 3,000
From United Kingdom ..	9,100	+ 3,600
„ Canada	5,800	− 2,100
„ South Africa	1,100	+ 700
„ United States		
Other electrical goods and apparatus	94,900	+ 32,300
From United Kingdom ..	72,600	+ 20,700
„ Canada	2,500	+ 2,000
„ South Africa	2,700	+ 200
„ United States	17,100	+ 10,000
Batteries	33,900	− 5,900
From United Kingdom ..	12,300	− 2,500
„ Canada	2,800	+ 1,000
„ South Africa	7,900	− 500
„ United States	10,800	− 3,400
Motors and parts	48,700	+ 23,100
From United Kingdom ..	47,800	+ 23,600
„ United States	800	+ 200
Transformers	41,000	− 42,600
From United Kingdom ..	39,600	− 42,700
„ United States	1,100	− 300
Other electrical machinery ..	162,800	+ 27,400
From United Kingdom ..	156,800	+ 37,900
„ South Africa	1,600	− 2,200
„ United States	4,300	− 8,400

ELECTRICITY SUPPLY

Harrogate Jubilee. Lots Road Hold-up.

Birkenhead.—POWER STATION EXTENSION.—The Electricity Committee has obtained consent for the final extension of the power station by a further 50,000-kW set.

STREET LIGHTING.—The Highways Committee has approved an estimate of £19,539 for street lighting and £800 for traffic signs on the Woodchurch estate.

Darlington.—CONDENSER COOLING SCHEME REJECTED.—Following expert advice the Corporation Gas, Electricity and Water Committee has decided against a £120,000 scheme for using water from the River Skerne for the condensers at the generating station. For some years complaints have been made that dampness is caused in houses through precipitation from the cooling towers. The Committee is now to consider other means of overcoming the difficulty.

H.V. FEEDERS.—Application has been made for sanction to borrow £52,185 for h.v. cables.

ALTERATIONS TO COOLING TOWER.—Alterations costing £13,400 are to be made to No. 1 cooling tower at the electricity works to reduce precipitation.

Edinburgh.—COMPULSORY PURCHASE INQUIRY.—A public inquiry was held in the City Chambers, Edinburgh, on March 19th, by Mr. A. N. East, on behalf of the Minister of Fuel and Power, into an application by Edinburgh Corporation for confirmation of a Compulsory Purchase Order in respect of land in High Street, Portobello. Mr. C. J. D. Shaw, on behalf of the Corporation, supported the claim that a site on which there were at present properties, including a garage, shop, and offices, was necessary for the erection of a 33,000-V switchhouse, to be erected as one of the first instalments of a comprehensive long-term scheme for increased generation and distribution of electricity. Mr. D. M. Campbell, on behalf of Mr. S. M. Greaves, one of two proprietors objecting to the Order, contended that the Corporation had adjacent ground which was suitable for the immediate development.

Minister's decision will be intimated later.

Harrogate.—UNDERTAKING'S JUBILEE. — The jubilee of the municipal electricity undertaking is to be celebrated by the Electricity Committee on April 15th. For guests who are not familiar with the Corporation's area of distribution (electrical engineer: Mr. A. Kelso) there will be motor coach tours with a mid-morning halt at Upper Midderdale and luncheon at the cathedral city of Ripon, while tea will be served at Knaresborough and dinner at the Hotel Majestic in Harrogate will be followed by a conversazione and cabaret.

Hazel Grove and Bramhall.—REBATE TO CONSUMERS.—A rebate of 20 per cent is to be allowed on charges for electricity consumed during the March quarter. At a meeting of the Urban District Council the chairman said that the Electricity Committee had taken this decision in view of the fact that the undertaking was to be nationalized.

London.—TROUBLE AT LOTS ROAD.—On Monday last the Lots Road (Chelsea) power station of the London Passenger Transport Board was seriously affected by the fouling of the screens of the cooling water intake by debris brought down the Thames by the floods. For about two or three hours the output was substantially reduced and the loss of power caused the slowing down or suspension of services on the District, Piccadilly, Northern, Central and Bakerloo lines. Normal conditions were restored by about 10 a.m.

Middlesbrough.—HOUSING INSTALLATIONS.—New tenders are to be invited by the Town Council for the installation of electricity in houses on the Thorntree and Cumberland Road Estates. Tough rubber cable is to be specified instead of conduits in view of the difficulty of obtaining the latter.

Northern Ireland.—INCREASED BORROWING POWERS.—Under the Electricity (Supply) Bill which has been presented to the Ulster House of Commons the borrowing powers of the Electricity Board for Northern Ireland are increased by £2,000,000. The Bill also increases by £1,100,000 the sum which may be advanced to the Ministry of Commerce under the Electricity (Emergency) Supplies Act of 1942. This is required for the financing of the extension of Ballylumford generating station by the installation of the third set, work on which is at present in progress.

North Wales.—HYDRO-ELECTRIC SCHEME.—Referring to the North Wales Power Co's. £15,000,000 hydro-electric scheme, which was submitted to the Government and is under discussion by the Central Electricity Board, an official of the company has stated that they have not been told they must not go on with it, but it needs a Parliamentary Bill and that means delay. Ground has been surveyed, but no actual boring has been undertaken. The plan would involve the construction of six major power stations, with an output of 300,000 kW.

Oldham.—FRINGE ORDER.—The Electricity Committee is to apply for a Fringe Order to supply electricity to a housing estate at Limehurst.

Portishead.—COAL HANDLING.—The Electricity Committee proposes to spend £27,000 on improving the coal handling facilities at the generating station.

South Shields.—SUBSTATION EQUIPMENT.—The Town Council is to increase the capacity of the Prince Edward Road substation from 250 to 500 kW at a cost of £1,450.

Swansea.—"ALL-ELECTRIC" HOUSES. — The Housing Committee has decided that 400 houses at Penlan and 62 at Waunarlwyyd shall be "all-electric."

Westminster.—FOG LIGHTING.—The Commissioner of Police has reported favourably on the sodium discharge floodlighting units installed a year ago at Grosvenor Gardens for the assistance of traffic during fog, and has asked the City Council to extend the lighting in the vicinity of Victoria Station.

Overseas

Canada.—HYDRO-ELECTRIC SCHEMES.—Work has commenced on the construction of a diversion dam which is part of the $50,000,000 Bridge River power development programme of the B.C. Electric Railway Co. The dam is being built 130 miles north of Vancouver, and will divert water from the Bridge River through a tunnel under Mission Mountain to Seton Lake.

The Premier of Ontario announced recently that agreement had been reached with the Premier of Quebec for the two provinces to develop new power sites on the Ottawa River. Installations capable of generating 200,000 H.P. are to be established at Chenaux and Cave Rapids.

Poland.—ELECTRIC POWER PRODUCTION.—Generation of electricity amounted in 1946 to 5,300 million kWh, or 37 per cent more than before the war. About 50 per cent of electric lines in the regained territories were reconstructed, several generating stations were rebuilt, and Silesia was linked up with Warsaw. During the year 480 villages were electrified. The Three-Year Economic Plan provides for the extension of existing generating stations and the building of a new 150,000-kW. plant at Miechowice. In 1947 the production of 6,000 million kWh or 206 per cent of the pre-war output, is planned.

New Generating Plant

Extensions for which arrangements were made by the Central Electricity Board with Authorized Undertakings during 1946

Scheme Area and Station	Owners	Turbo-alternators (kW)	Boilers (lb per hr)
Scotland—			
Clyde's Mill	Clyde Valley Co.	2–30,000	4–180,000
Portobello	Edinburgh	1–60,000	1–540,000
Braehead	Glasgow	1–50,000	2–300,000
N.W. England & N. Wales—			
Bromboro'	Birkenhead	2–50,000	4–300,000
Whitebirk	Blackburn	1–40,000	3–150,000
Carrington	Manchester	2–57,000	4–360,000
		2– 3,000*	
Agecroft	Salford	2–50,000	4–315,000
		2– 2,500*	
Hartshead	Stalybridge, etc. Board	1–30,000	1–150,000
		1– 1,500*	
Westwood	Wigan	3–30,000	4–300,000
Mid-East England—			
Grimsby	Grimsby	—	2– 80,000
Skelton Grange	Leeds	3–60,000	6–360,000
Prince of Wales	Rotherham	1–50,000	2–200,000
		1–30,000	2–200,000
Thornhill	Yorkshire E.P. Co.	1–45,000	2–180,000
Central England—			
Staythorpe	Derby & Notts E.P. Co.	3–60,000	9–240,000
Walsall	West Midlands J.E.A.	2–30,000	4–150,000
S.E. & E. England—			
Brighton	Brighton	3–52,500	6–320,000
Bankside	City of London E.L. Co.	2–50,000	4–300,000
Barking	County of London Co.	3–75,000	6–405,000
S.E. & E. England (*contd.*)—			
Beddington	Croydon	1–50,000	2–320,000
		1– 2,500*	
Cliff Quay	Ipswich	1–45,000	2–365,000
Rye House	Northmet Power Co.	2–30,000	2–350,000
		2– 2,000*	
Peterboro'	Peterborough	2–20,000	3–160,000
Brunswick Wharf	Poplar	3–52,500	6–320,000
West Ham	West Ham	1–30,000	2–180,000
S.W. England & S. Wales—			
Poole	Bournemouth & Poole E.S. Co.	3–50,000	6–300,000
Carmarthen Bay	Llanelly & District E.S. Co.	2–52,500	8–175,000
Plymouth	Plymouth	2–30,000	3–320,000
		2– 1,500*	
Llynfi	South Wales E.P. Co.	2–30,000	2–300,000
	TOTAL	2,451,000	28,940,000
The Agecroft (Salford) extension cancels a previous direction for 2–50,000-kW sets and 4–300,000 lb/hr boilers		−130,000	−1,400,000
The Prince of Wales (Rotherham) extension cancels a previous direction for 1–30,000-kW set and 1–200,000 lb/hr boiler			
Net additional plant		2,321,000	27,540,000

* Auxiliary sets.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The County of London Electric Supply Co., Ltd.—In the course of his speech at the annual meeting held on March 18th, Sir Robert Renwick (chairman), in referring to the Electricity Bill, said that he considered the basis of compensation was grossly unfair. On the basis of Stock Exchange prices compensation would total £37,239,726. In their company alone they had stockholders, including debenture holders, numbering over 40,000. Assuming the new stock yielded 2½ per cent, their stockholders would receive an income of just under £931,000, as compared with their present income of £1,418,626. This represented a drop of over 3¼ per cent. During the year they had made reductions in the lighting flat rates in rural areas throughout the group, involving reductions up to 22 per cent in the accounts of the consumers affected. The new boards to be formed were to secure the use of the best methods of generation and transmission, the cheapening of supplies, the avoidance of undue preference and the simplification and standardization of charges and systems. Every one of these objectives had already been performed or was in process of completion by the industry as it stood to-day.

South London Electric Supply Corporation, Ltd.—Sir Robert Renwick (chairman), dealing with the accounts at the annual meeting, stated that a striking recovery had been made since the war ended. The number of consumers at the end of 1946 was 51,500, compared with approximately 44,000 at the end of 1938. This showed that they had carried on development at full speed despite the threat of nationalization, and the shortage of materials. Sales had increased by 19 million kWh to 85 million kWh and the average price had dropped by 5 per cent. Sales for lighting, heating and cooking last year were approximately 63·8 million kWh, compared with under 45 million in 1945 and rather less than 43 million in 1938. The restriction on the use of domestic electricity, for which neither the companies nor the municipalities were to blame, was a bitter blow to those engaged in the industry. Sir Robert Renwick criticized the terms of the Electricity Bill on similar lines to his speech at the County of London meeting reported above.

The Northmet Power Co.—Lord Ashfield was unable to attend the annual meeting held on March 18th owing to ill health and Mr. H. A. Scott Moncrieff, presided. Mr. Evelyn Boys, secretary, read Lord Ashfield's speech, in which the chairman said that in 1919 the area of supply covered 326 sq miles; it now extended to 671 sq miles and the number of consumers now totalled 350,000, as against 22,000 in 1919. The output had grown from 53 million kWh in 1919 to 1,220 million kWh in 1946, while the total capital expenditure had grown from something over one million to more than £13 millions, and if the Station Co. was included, the total capital expenditure was over £19 millions. The average price per kWh sold in 1919 was 1·463d.; to-day it was 1·108d. A supply of electricity was available in 131 townships and parishes out of a total of 137 in the company's area of supply. Referring to the Electricity Bill, Lord Ashfield said that a substantial decrease of annual income would be suffered by all classes of stockholders under the proposed terms of compensation and on certain assumptions made by the Chancellor of the Exchequer. It must on any impartial view be conceded that the financial position of the undertaking demanded more equitable treatment than that afforded by the compensation provisions of the Bill.

The Yorkshire Electric Power Co., held its annual meeting on March 17th. In the absence through illness of Sir R. Geoffrey Ellis, Bt. (chairman), Lord Ramsden (one of the joint deputy chairmen) presided and read the chairman's speech. The chairman said that there was little to add to the letter dealing with the Electricity Bill circulated with the report and accounts, except to draw attention in the accounts to the large total cash, investments and other assets above and beyond the capital basis required to earn current revenue. The Electrical Distribution of Yorkshire shareholdings alone had a take-over value of £535,709, the North Lincolnshire wholly-owned subsidiary £500,000 at par, and Electricity House (a half interest) £50,000. A large amount of capital had been invested in the last two companies and they were only just beginning to show a reasonable return. Both were full of promise and should provide a steadily increasing volume of revenue. The new Electricity Authority would, however, be the sole beneficiary. In these critical days of striving for recovery, the complete breaking up and reforming of the great industry of generation and distribution of electricity could do no other than slow down the general tempo of industry, seriously affecting both our home and foreign markets. It would have been better to postpone this Bill, to re-examine the whole electricity system in relation to a better grouping of areas, and gradually with the skilled knowledge and help of existing organizations, to introduce the necessary changes as and when practicable.

International Combustion, Ltd.—With the accounts were circulated statements by Mr. G. R. T. Taylor (chairman) and Sir George Usher (managing director). Sir George Usher said that they had a vast number of orders on

hand and the unfulfilled order book was more than ten times as great as when he last addressed the shareholders in 1940. Many of the orders were for export, the most interesting being the largest high-pressure boiler plant ever installed in the British Empire. He also referred to the development of their research department and engineering laboratories. With regard to Aberdare Cables, Ltd., and South Wales Switchgear, Ltd., in which they were interested, both companies were growing at a highly satisfactory rate.

E. K. Cole, Ltd.—At the annual meeting held recently, Mr. E. K. Cole (chairman and managing director) said that in the main the changeover in all their factories had been completed by September last. Reviewing the work of the various sections, he said that the Radio Division had made good progress and in the television field a steady increase had been made in the output of receivers. With regard to the Lighting Division, a range of fittings, control gear and all other accessories for fluorescent lighting was in production. The Ekco-Ensign lighting interests now formed virtually one organization and it was proposed to change the name of Ensign Lamps, Ltd., to Ekco-Ensign Electric, Ltd., and to arrange for this subsidiary to be responsible for the whole of the lighting activities. After dealing with plastics and referring to the large demand for Thermovent space heaters which had compelled them to close the order book, he turned to the export trade. In this field the company had sent to 80 countries equipment to a value ten times greater than in the year before the war.

Mersey Railway Co.—In his statement at the annual meeting the chairman, Mr. J. Waddell, spoke of the outlay on converting the system to electric traction and later the bringing into operation of a through service of electric trains with the L.M.S. Co., which had proved of immense benefit during the war. The enterprise shown by the company had never reaped its full reward, he said, and serious injustice would be done to the stockholders if the nationalization proposals were carried through as they stood.

Clarke, Chapman & Co., Ltd.—At the annual meeting the chairman, Mr. W. A. Woodeson, said that their output last year was again above the £2,000,000 mark and their order book had exceeded all previous records; at the end of 1946 it amounted to £4,000,000, and now, with an order for steam generating plant for the new Poplar power station, it stood round about £7,000,000. They had a large and valuable list of orders for export work, and could increase it very considerably if they could obtain the materials to meet the required delivery dates.

Enfield Rolling Mills, Ltd.—The Earl of Verulam (chairman), in a circulated statement submitted at the annual meeting, said that the directors considered that the time had arrived when additional working capital was required. They had agreed that the immediate need could be met by the issue of £400,000 of additional share capital in the form of 4½ per cent cumulative preference shares of £1 each. During 1946 many factories were seriously affected by the coal shortage and had to reduce output. It had therefore been decided to convert the zinc furnaces from coal to oil. Thereafter, the only fuel used by the company would be oil, while for electricity the company depended upon the Northmet Co. The sheet and strip mill had achieved a high rate of production throughout the year.

The subscription list for the new issue of shares opened and closed on Wednesday last.

Switchgear & Cowans, Ltd., are paying a dividend of 10 per cent compared with 25 per cent (including bonus of 5 per cent) last year. The profit for 1946, after depreciation and tax, is given as £1,584 (against £20,376 after allocating £1,000 to pensions) to which is added £5,000 (nil) transferred from war contingencies. There is no provision for general reserve (last year £2,000) and the carry-forward, at £22,252, is practically unaltered.

Ericsson Telephones, Ltd., reports a trading profit for 1946 of £153,513, as compared with £373,951 for the previous year, and a net profit of £100,911 (against £112,912). General reserve receives £20,000 and the ordinary dividend is 17 per cent (same) with a bonus of 3 per cent (same), both tax free. The balance carried forward is £58,212 (against £46,307 brought in).

Associated Electrical Industries, Ltd., proposes to pay a final dividend on the ordinary stock of 7½ per cent and a bonus of 2½ per cent, both less tax, making a total distribution for the year of 15 per cent (against 10 per cent).

The National Gas & Oil Engine Co., Ltd., reports a profit for the year ended December 31st last of £37,128 (against £48,127 for 1945). The ordinary dividend for the year is unchanged at 5 per cent and £39,519 is carried forward (against £40,240 brought in).

The North-Eastern Electric Supply Co., Ltd., reports a profit for the year ended December 31st last of £376,742, as compared with £271,910 for the preceding year, and after adding £246,980 brought in and transferring £225,638 to provision for contributory superannuation fund deficiency, there is a balance of £398,084 (against £506,318). The dividend on the ordinary stock for the year is maintained at 7 per cent by a final payment of 4½ per cent and £112,812 is carried forward.

Lothians Electric Power Co.—Total revenue for 1946 amounted to £326,634 (against £302,519) and there was a net profit of £44,831 (£20,129). The final ordinary dividend of 4 per cent makes 7 per cent for the year, and £46,543 (£21,347) is carried forward.

Metropolitan Electric Supply Co., Ltd.—Net revenue last year increased from £668,912 to £828,682. After charging £316,741 (against

£349,379) for income tax and providing £90,000 (nil) for future income tax the net profit was £438,213 (£319,113). Reserve receives £217,908 (£128,192) and £216,370 (£164,737) is carried forward, after maintaining the ordinary dividend at 9 per cent by a final payment of 6 per cent. The net profit of the group, after taxation, was £558,132 (£312,143).

Lancashire Dynamo & Crypto, Ltd., reports a net profit for 1946 of £92,382 (against £88,317 for 1945), after providing £12,839 (£13,600) for depreciation. The dividend on the old ordinary shares is again 22½ per cent, the new shares ranking for three-fifths of this rate. The carry-forward is raised from £139,131 to £173,193.

The report outlines the company's expansion programme. Manufacture of F.H.P. motors is to be undertaken on a large scale at a modern factory leased from the Government at Cardiff. The board is discussing participation with four other British manufacturers in the establishment of a local works at Johannesburg for the manufacture of transformers, and negotiations are proceeding with interests in India for the manufacture of electric motors in Bombay. A resolution is to be submitted for the conversion of 50,340 £1 ordinary shares into stock.

The Clyde Valley Electrical Power Co. reports a profit for 1946 of £680,189, as compared with £498,715 for 1945, to which is added £27,722 additional amount of E.P.T. recovered for 1945 and £208,315 brought in, making £916,226. After transferring £275,000 to contingency fund and making a special contribution of £50,000 to superannuation, it is proposed to pay a final ordinary dividend of 5 per cent, making 8 per cent for the year (same), and to carry forward £281,226.

The West Gloucestershire Power Co., Ltd., reports a decline in net revenue from £139,862 in 1945 to £129,912 last year, before allowing £41,900 (£63,500) for taxation. General reserve receives £30,964 (£28,529), the ordinary dividend is repeated at 6½ per cent and £33,978 (£16,814) is carried forward.

The Llanelly & District Electric Supply Co., Ltd., reports an operating profit for 1946 of £172,051, as compared with £154,454 for 1945. Tax requires £51,515, depreciation £58,803 and general reserve £14,500. The ordinary dividend for the year is maintained at 6 per cent.

The Northwood Electric Light & Power Co., Ltd., reports a profit of £23,127 for 1946 (against £14,930 for 1945). The ordinary dividend is unchanged at 8 per cent.

The Electrical Distribution of Yorkshire, Ltd., proposes to pay an unchanged final dividend of 4½ per cent, again making 9 per cent for the year.

A. C. Cossor, Ltd., have declared an interim dividend of 6 per cent less tax (against 3 per cent free of tax).

Regarding the capital profit referred to in the directors' report it is stated that the amount of the capital bonus which they will recommend for distribution from this source will be 7 per cent in cash on the £600,000 ordinary share capital of the company. As this is a capital bonus, it is not subject to tax.

The Anglo-American Telegraph Co., Ltd., is paying an interim quarterly dividend of ¾ per cent (same).

The Renold & Coventry Chain Co., Ltd., has declared an interim dividend of 3 per cent, the same as last year.

The Nigerian Electricity Supply Co., Ltd., is paying an unchanged interim dividend of 3 per cent.

J. & F. Stone Lighting & Radio, Ltd., is again paying an interim dividend of 10 per cent.

New Companies

G. E. Wallis & Sons (Electrical), Ltd.—Registered March 19th. Capital, £20,000. Electrical, mechanical and general engineers, etc. Directors: G. P. G. Wallis, F. L. Wallis, K. St. G. Laurence and L. F. Goodwin. Regd. office: Broadmead Works, Maidstone, Kent.

Apollo Electrical Appliances, Ltd.—Registered February 22nd. Capital, £1,000. Manufacturers of, and dealers in, wireless, television and electrical apparatus and accessories, etc. Regd. office: 9, Mansfield Street, W.1.

Alva (Manchester) 1947, Ltd.—Registered February 8th. Capital, £300. Electrical and radio engineers, etc. Directors: D. G. Davies and I. Heilbron. Regd. office: 10, Cliff Crescent, Higher Broughton, Salford.

Gannow Electrical & Refrigeration Co., Ltd.—Registered March 6th. Capital, £800. Directors: A. Yates, Mrs. I. Yates, and J. J. Thompson. Regd. office: 146, Padiham Road, Burnley.

West Mon. Electrical Co., Ltd.—Registered February 4th. Capital, £500. Directors: I. Parton and J. Morgan. Regd. office: Libanus Road, Ebbw Vale, Mon.

Increase of Capital

Elliott Brothers (London), Ltd.—Capital increased by £285,000 beyond the registered capital of £90,000.

Bankruptcies

C. J. Jackson, lately carrying on business at Tower Works, Clapham, S.W.4, as the Industrial Amplifier & Telephone Co., radio and electrical engineer.—Receiving order made March 7th. First meeting to-day (Friday); public examination May 1st; both at Bankruptcy Buildings, Carey Street, W.C.2.

A. Ambrose, residing and carrying on business at 137, Market Street, Chorley, Lancs, and formerly residing and carrying on business at 39, Steeley Lane, Chorley, electrical engineer.—Last day for receiving proofs for dividend April 8th. Trustee, Mr. H. S. Haworth, 7, Lord Street West, Blackburn, Official Receiver.

STOCKS AND SHARES

THE Stock Exchange markets have been depressed by substantial falls in Consols and other British Government securities. The Government has stood on one side, allowing market prices to find their own level, with the result that a steady stream of selling found no resistent support. Weakness spread throughout the gilt-edged group. The depression found reflection in the prices of preference and ordinary shares in the industrial sections.

The popular explanation of this unexpected reverse to prices is that the Budget must be held largely responsible. Contributory causes include uncertainty as to what is likely to be the outcome of the fuel shortage—more especially the manner in which profits, earnings, and balance sheets to be published a year hence, will be affected by the current crisis. Already it is assumed that profits of many companies will be substantially lower as a result. Comparatively little selling has a marked effect upon prices in Stock Exchange markets that might be regarded as vulnerable to unfavourable influences by reason of the high levels which so many prices had reached. The boomlet in South American power stocks has subsided, and prices stand below their recent best.

A Fortnight's Fluctuations

In the electrical equipment market, prices have held their own moderately well during the month of March, although losses outnumber gains. The A.E.I. results assisted others in the heavy equipment group. English Electric have more than recovered the deduction of the dividend, at 65s. 9d. ex dividend. General Electrics, however, have lost 1s. 6d. to 94s. 6d. Cable manufacturers' shares are mostly easier, Telegraph Construction being 1s. 9d. lower at 57s. 3d. Elsewhere, British Aluminiums have added 4s. to 47s. 6d. on the restoration of the dividend from 8 to 10 per cent. International Combustions have advanced further to £12, and Reyrolles are firm at 76s. 3d. The electricity supply market shows few significant changes over the past fortnight. De la Rue at 65s. are 10s. lower. Switchgear & Cowans fell 10s., to 15s., on the announcement of a 10 per cent dividend, comparing with 25 per cent dividend and bonus a year ago.

A.E.I.

Associated Electrical Industries ordinary rose 5s. to £4 on declaration of a dividend and bonus making, with the interim dividend, 15 per cent for the year. A subsequent reaction to 78s. left the price 3s. up on the fortnight. The annual dividend for the past ten years has been a consistent 10 per cent. The company's profit statement is exceedingly good. For the consolidated group, the profit for the year, £1½ million, is £614,000 up on the year. The board is treating the figures in a conservative manner, allocating £275,000 to meeting possible losses due to the fuel crisis. With 9s. income tax this amount is equal to practically £500,000. At the present price, the yield is £3 17s. per cent and the company is in a strong financial position.

Equipment and Manufacturing

Discrimination in the matter of deciding between essential and non-essential industries for current investment purposes has been further directed towards electrical equipment shares by the Government's emphasis on the urgent need for electrical generating plant. Attention has been drawn to the market by the practical shape which the official plans for increased production appear to be taking. On the strength of these developments, shares of the manufacturers of, in particular, heavy equipment, form one of the firmest sections of the industrial market.

Electricity Supply

The opening of the dividend and report season in the market for electricity supply shares has, of course, been robbed of much of its interest by the preoccupation with nationalization considerations, but an impression has been made by some of the speeches, at company meetings, dealing with that subject. Sir Robert Renwick effectively attacked the evils and injustices of the plan, in principle and detail, at the meetings of the County of London and South London companies. He calculated that stockholders in the former company will lose 34 per cent of their income if securities are exchanged for 2½ per cent compensation stock. On the same basis, the loss to shareholders and debenture holders of South London Electric would be as much as 40 per cent. Meanwhile, the market in the shares maintains indifference alike to the uncertainties of other industrial markets and the weakness of gilt-edged.

Radio Shares

Faulty reporting of the A.C. Cossor interim dividend was responsible for erratic movements in the price of the shares. The 6 per cent payment declared last week is subject to income-tax, whereas last year's interim of 3 per cent was paid tax-free. First reports on the decision led to misunderstandings by reference to a doubling of the distribution. In fact, it represents a net increase of about one-third per cent. After rising sharply to over 36s. in anticipation of the statement, the price of the shares relapsed to 32s., recovering later to 33s. Electric & Musical ordinary at 24s. 9d. are 1s. 6d. easier. Scophony at 10s. have lost 6d. Radio & Television at 8s. 6d. gave gained the pence. At 123½, Cable & Wireless preference is 2 points to the good; the ordinary at 157½ shows no change.

Ericsson Telephones are maintaining the distribution for 1946 at the wartime rate of 20 per cent tax free, which compares with the pre-war level of 25 per cent. A decline of 3s. 9d. has lowered the price of the shares to 46s. 3d. since the announcement.

ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Est. Comp*	Last Div.	Middle Price Mar. 21	Month's Rise or Fall	Yield p.c.
Home Electricity Ordinary					£ s. d.
Bournemouth and Poole	66/8	12½	64/-xd ..		3 18 2
British Power and Light	37/10	8	36/-	−1/-	4 9 0
City of London ..	34/4	7	33/- ..		4 4 10
Clyde Valley ..	46/5	8	44/6xd ..		3 12 1
County of London	49/5	10	47/6	−1/-	4 4 0
Edmundsons ..	31/6	6	30/- ..		4 0 0
Elec.Dis.Yorkshire	51/-	9	49/- ..		3 13 6
Elec. Fin. and Securities ..	67/-	15	63/6xd ..		4 14 3
Elec. Supply Corporation ..	50/8	10	49/- ..		4 1 7
Lancs. Light and Power.. ..	37/7	7½	36/6	−6d.	4 2 1
Llanelly Elec. ..	29/1	6	28/- ..		4 5 9
Lond.Assoc.Electric	29/6	6	28/6 ..		4 4 3
London Electric .	31/4	6	30/- ..		4 0 0
Metropolitan E.S.	48/-	9	46/3	−6d.	3 18 3
Midland Counties	51/5	8	49/-xd ..		3 5 3
Mid. Elec. Power	47/-	9	45/- ..		4 0 0
Newcastle Elec...	32/7	7	30/6xd ..		4 11 10
NorthEasternElec.	36/6	7	34/6xd ..		4 1 2
Northampton ..	50/11	10	49/-xd ..		4 1 8
Northmet Power.	48/2	9	46/-xd ..		3 18 3
Scottish Power ..	46/1	9	44/6 ..		4 1 0
Southern Areas..	24/-	5½	23/6 ..		4 13 7
South London ..	33/-	7	31/6 ..		4 9 0
Yorkshire Elec...	50/10	9	48/6	−1/-	3 14 5

Company	Dividend Previous	Dividend Last	Middle Price Mar. 7	Month's Rise or Fall	Yield p.c.
Public Boards					£ s. d.
Central Electricity:					
1963–93 ..	3½	3½	108½ ..		3 4 6
1974–94 ..	3½	3½	107½ ..		3 0 6
LondonElec.Trans.	2½	2½	101½ ..		2 9 3
Lond.Pass.Trans.Bd.					
A . ..	4½	4½	127½	−1	3 10 7
B	5	5	125½	−1	4 1 0
C	3	3	62½	−1	4 16 0
Overseas Electricity Companies					
Atlas Elec. ..	Nil	Nil	14/3	−6d.	—
Calcutta Elec. ..	6†	6†	52/6	−½	2 5 8
Cawnpore Elec...	13	13	63/6	+1/-	4 1 9
EastAfricanPower	7	7	48/-	+6d.	2 18 3
Jerusalem Elec...	5	5	24/- ..		4 3 4
Madras Elec. ..	4	6	47/6 ..		2 10 5
Montreal Power..	1½	1½	29	−1	—
Nigerian Elec. ..	10	12½	52/6 ..		4 15 3
PalestineElec."A"	5†	6†	36/3	−1/3	3 6 4
Perak Hydro-elec.	6	7	16/6 ..		—
Tokyo Elec. 6% .	6	6	52½	+2½	—
VictoriaFallsPower	15	19	6⅞ ..		3 0 1
Whitehall Inv.Pref.	—	6	28/-xd ..		4 5 9
Equipment and Manufacturing					
Aron Elec. Ord...	15	10	47/6	−½	4 4 2
Assoc. Brit. Eng.	8	12	42/6 ..		5 13 0

Company	Dividend Previous	Dividend Last	Middle Price Mar. 21	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing (*Continued*)					£ s. d.
Assoc. Elec. :					
Ord.	10	15	78/-	+3/-	3 17 0
Pref.	8	8	46/6 ..		3 9 0
AutomaticTel.&El.	12½	12½	74/6	−1/-	3 17 2
Babcock & Wilcox	12	12½	73/-	−1/6	3 8 6
Baldwin,H.J.(2/-)	10	20	11/9	−3d.	3 8 0
British Aluminium	10	10	47/6	+4/-	4 4 0
B.I. Callender's ..			47/6	−6d.	—
British Rola (2/-)	15	15	5/9 ..		5 4 2
BritishThermostat (5/-)	18½	18½	22/6 ..		4 2 3
BritishVac.Cleaner (5/-)	30	20	21/3	−½	4 14 1
Brush Ord.(5/-)..	10	4	9/3	+3d.	2 3 3
Burco (5/-) ..	15	20	27/6	−6 .	3 12 8
ChlorideEl.Storage	15	15	91/3	−⅝	3 5 9
Christy Bros. ..	12½	17½	85/- ..		4 2 4
Cole, E. K. (5/-) .	20	20	26/-xd	−1/6	3 17 0
Cossor, A. C. (5/-)	10†	12½†	33/-	+9d.	1 17 10
Crabtree (10/-) ..	17½	17½	45/3xd	−9d.	3 17 4
CromptonParkinson Ord. (5/-) ..	22½	22½	33/- ..		3 7 4
De La Rue(5/-)..	40	45	65/-	−10/-	3 4 6
Decca (1/-) ..100		112	56/3	−1/6	2 0 0
E.M.I. (10/-) ..	8	8	24/9	−1/6	3 4 8
Elec. Construction	12½	12½	63/3	−9d.	3 19 0
Enfield Cable Ord.	12½	12½	49/3	−1/-	—
English Electric .	10	10	65/9xd	+9d.	3 2 6
Ericsson Tel. (5/-)	20†	20†	46/3	−⅞	2 3 3
Ever Ready (5/-)	40	40	45/6	−6d.	4 8 0
Falk Stadelmann	7½	10	45/- ..		4 9 0
Ferranti Pref. ..	7	7	37/- ..		3 15 8
G.E.C. Pref.	6½	6½	38/9 ..		3 7 0
Ord.	17½	17½	94/6	−1/6	3 14 0
GeneralCable(5/-)	15	25	35/6	+6d.	3 10 5
Greenwood&Batley	15	15	57/6	+⅛	5 4 5
H.T.A. (10/-) ..	12½	10	20/-	−9d.	5 0 0
Heatrae (3/-) ..	12½	12½	7/6 ..		5 0 0
Henley's (5/-) ..	20	20	26/6	−6d.	3 15 9
4½% Pref. ..	4½	4½	28/-	−1/6	3 4 4
Hopkinsons ..	17½	20	5 ..		4 0 0
Intl. Combustion	32½	37½	12	+¼	3 18 0
Johnson & Phillips	15	15	80/- ..		3 15 0
LancashireDynamo	22½	22½	5¼xd	+⅜	3 19 10
Laurence,Scott(5/-)	12½	12½	15/6 ..		4 0 8
London Elec. Wire	7½	7½	42/6 ..		3 10 9
Mather & Platt ..	10	11	58/- ..		3 15 10
Metal Industries(B)	9	10	57/6	−⅜	3 9 6
Mid. Elec. Mfg. ..	25	35	9½xd	+⅜	3 15 9
Murex	20	20	4½	−½	4 9 7
Newman Ind.(2/-)	22½	22½	9/-	−3d.	5 0 0
Plessey (5/-) ..	20	30	34/6 ..		4 7 0
Power Securities.	6	6	32/- ..		3 15 0
Pye Deferred (5/-)	25	25	30/-	−1/3	4 3 4
Radio & Tel. (2/-)	25	40	8/6	+6d.	4 14 2
Revo (10/-) ..	17½	20	51/3 ..		3 18 0
Reyrolle ..	12½	12½	76/3	+⅛	3 5 8
Scophony (5/-) ..	—	—	10/-	−6d.	—
Siemens Ord. ..	7½	7½	36/6	+6d.	4 2 2

(*Continued on next page*)

* Proposed amount of British Electricity Stock to be allotted.
† Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price Mar. 21	Month's Rise or Fall	Yield £ s. d.
Equipment and Manufacturing (*Continued*)					
Strand Elec. (5/-)	10	12½	11/9	+3d.	5 6 5
Switchgear & Cowans (5/-)	20	10	15/-	−9/6	3 6 8
T.C.C. (10/-)	10	12½	33/6	..	3 14 8
T.C. & M.	10	10	57/3	−1/9	3 10 0
TelephoneMfg.(5/-)	9	9	13/6	..	3 6 8
Thorn Elec. (5/-)	20	20	25/-	−2/-	4 0 0
Tube Investments	22½	22½	6½	−¼	3 9 3
Vactric (5/-)	Nil	Nil	16/-	−6d.	—
Veritys (5/-)	7½	7½	7/3	..	5 3 5
WalsallConduits(4/-)	55	55	54/-	..	4 1 6
Ward & Goldstone (5/-)	25	35	51/3	−4/3	3 8 6
Watford (2/-)	15	15	7/9	..	3 17 6
WestinghouseBrake	14	14	71/6	..	3 18 5
West, Allen (5/-)	7½	7½	10/3	+3d.	3 13 2
Traction and Transport					
Brit.Elec.Traction: Def. Ord.	45	45	1205	−20	3 14 9
Pref. Ord.	8	8	190	..	4 4 3
Calcutta Trams.	6½	7½	53/6	−1/6	2 16 0
Cape Elec. Trams	5	6	42/6	−⅛	2 16 5
Traction and Transport (*Continued*)					
Southern Rly.: 5% Prefd.	5	5	73½	..	6 16 1
5% Pref.	5	5	119½	..	4 3 8
T. Tilling	10	10	55/6	−6d.	3 12 5
West Riding	10	15	47/6	−¼	6 7 9
Telegraph and Telephone					
Anglo-Am. Tel.: Pref.	6	6	141	−1	4 5 3
Def.	1½	1½	32	−2	4 12 9
Anglo-Portugnese	8	8	29/6	−1/-	5 8 6
Cable & Wireless: 5½ Pref.	5½	5½	123½	+2	4 9 1
Ord.	4	4	157½	..	2 10 9
CanadianMarconi	$1 Nil	4 cts.	15/-	+1/8	—
Globe Tel. & Tel.: Ord.	8¾†	5†	48/9	+6d.	2 1 0
Pref.	6	6	35/-	−1/6	3 8 7
GreatNorthernTel. (£10)	20	18	39	..	4 12 4
Inter. Tel. & Tel.	Nil	Nil	17	−1	—
Marconi-Marine.	7½	7½	35/6xd	..	4 4 6
Oriental Tel. Ord.	4	4	55/6	+½	—
Telephone Props.	Nil	6	21/6	..	5 11 7
Tele. Rentals(5/-)	10	10	14/6	−3d.	3 9 0

† Dividends are paid free of Income Tax.

Trade Marks

THE following applications have been made for the registration of trade marks. Objections may be entered within a month from the dates shown:—

March 6th

COMMUTROL. No. 642,651, Class 7. Electric generators and motors (not for land vehicles).—Macfarlane Engineering Co., Ltd., Netherlee Road, Cathcart, Glasgow, S.4.

CEPCO. No. 641,765, Class 9. Electrical apparatus included in Class 9. Also No. 641,766, Class 11. Lighting and heating apparatus.—Mary Maxwell-Channell, trading as Channell Experimental Products, High Street, Flore, Northampton.

KOCKUMS MALMÖ (design). No. B642,088, Class 9. Electrical apparatus and instruments, etc.—Kockums Mekaniska Verkstads Aktiebolag, Sweden. Address for service: H. N. & W. S. Skerrett, 24, Temple Row, Birmingham.

ROCON (design). No. 644,757, Class 9. Electric control apparatus.—Redler Conveyors, Ltd., Dudbridge Works, Stroud, Gloucestershire.

March 12th

RELLIM (design).—No. 639,538, Class 9. Electrical apparatus and instruments included in Class 9, but not including wire.—Miller & Miller, Ltd., 24, Mitchell Street, Glasgow.

REDIGRAM. No. B641,934, Class 9. Records of sound, light or electric signals; and instruments, apparatus and parts thereof (not included in other classes) for the production of and reproduction from such records.—Central Rediffusion Services, Ltd., Carlton House, Regent Street, London, S.W.1.

TUX (design). No. B643,319, Class 9. Electrical apparatus and instruments included in Class 9, and electronic apparatus.—Truvox Engineering Co., Ltd., Truvox House, Exhibition Grounds, Wembley.

CINECATOR. No. 644,314, Class 9. Electric apparatus for giving indications and effecting controls according to the seating accommodation at places of entertainment and the like.—R. A. Fletcher and L. H. Bevan, 2, Victoria Road, Sidcup.

WIT. No. B643,721, Class 11. Installations for lighting, heating, steam generating, cooking, refrigerating, drying, ventilating, etc.—L. A. Waller, 34, Longfield House, Uxbridge Road, Ealing, W.5.

HICON. No. 643,779, Class 11. Electrical heaters.—Hutchinson Instrument Co., Ltd., St. George's Works, All Saints' Road, Acton, W.3.

STYPTI. No. B644,331, Class 17. Insulating varnish.—J. M. Ratcliffe, Lillian M. Ratcliffe and Lillian I. Willington, trading as J. H. Ratcliffe & Co., 135a, Linaker Street, Southport.

ARCTON and DICLON. Nos. 645,808 and 645,810 respectively, Class 17. Insulating material.—Imperial Chemical Industries, Ltd., Wexham Road, Slough.

Space Heating

How Economic Planning Might Ease the Burden

By "Electricus"

THE Government has announced the appointment of a joint staff for economic and industrial planning, to act as a central control of departmental planning staffs. From the point of view of electricity supply, a properly run organization of this kind could be welcomed. Absence of co-ordinated planning has just proved disastrous; 2½ million electric fires have been allowed to pour into the home market since the end of the war, although it should have been obvious that there would not be sufficient generating plant available to meet the additional demand upon the system.

However, there is more involved. Shall electrification generally proceed on a *laissez-faire* basis, the duty of supply authorities being simply to watch the trends and see to it that all requirements are fulfilled, or shall there be co-ordinated planning and direction of development, to bring about maximum utilization of plant, and, therefore, most economic overall costs of supply? In this respect, examples have been set by countries relying on hydro-electricity, e.g., Switzerland, where electricity demand has successfully been made to match the rate of flow of water in the rivers, resulting in annual load factors of the order of 60 per cent.

What Cold-snap Demand Involves

In this country, the most serious problem confronting the electricity supply industry is the large seasonal variation of demand caused by the extensive use of electric space-heating, especially during the occasional spells of sustained frost. It is obvious that if, say, 15 per cent extra generating plant has to be provided to cover this cold-snap demand, then an increase of about 15 per cent* in corresponding total standing charges has to be made to all consumers.

One cause of cold-snap peaks—the use of electric fires to prevent pipes freezing—was referred to in a previous article.† This factor bears to some extent on economic planning, inasmuch as it should be made mandatory for the plumbing of new buildings to be arranged in such a way as to render it reasonably frost-proof. Another important cause of these peak loads has so far escaped full recognition, namely, the fact that most central-heating installations in business and domestic premises are designed for a minimum outdoor temperature of the order of 30 deg F. In order to keep first cost down, it is assumed by the landlord or builder that in sustained cold weather, the persons working or living in the premises concerned will either put up with discomfort or use an auxiliary source of heating—and there can be but little doubt what the source will be in most cases.

Central-Heating Layout

This is clearly a load that is thrown on the electricity supply systems only during the, normally, few days of the year when the day temperature is below freezing point. From the national point of view, it means that a much higher cost is forced on to the electricity authorities (and on consumers at large) than would have fallen on the individual landlord or builder if the central-heating installation had been laid out for a minimum outside temperature of, say, 25 deg F. There is, thus, another case for a central planning authority: to investigate which way is more economic from the broad national point of view, and to arrange for appropriate action to be taken, at least with regard to future installations.

The need for corrective action may be illustrated by a quotation from a "Memorandum on District Heating as Applied to Small Housing Estates," presented to the recent Fuel Conference:—"For example, the installation would provide a temperature rise of about 30 deg F in the occupied portions of the ground floor. . . . For the greater part of the winter, therefore, little—if any—supplementary heating would be required in the living-room, but under extremely cold conditions (which are comparatively rare) it would be necessary to use some auxiliary form of heating, such as a gas or electric fire, in order to raise the temperature of the living-room to the required level."

At 25 deg F outside temperature it would

* In fact, the cost per kW of new plant is more than double the average figure for pre-war plant.

† "The Crisis—and After," *Electrical Review*, March 7th, 1947.

therefore be necessary to add by other means one-third of the heat output of the built-in installation, in order to bring the living-room temperature to 65 deg F. If a 1-kW electric fire were used for the purpose, it would entail the provision of generating and transmission plant (disregarding distribution plant) costing something like £40, much more than it would cost to arrange the built-in installation for 40 deg F rise, instead of 30 deg F. Similar considerations apply to central-heating installations in blocks of flats, office buildings, shops, etc.

It is also possible to visualize a co-ordinated effort to bring down cold-snap demands by encouraging consumers to use simple oil stoves for the temporary heating of rooms where it is desired to protect water pipes. It would even be economic to issue such stoves for the specified purpose at a subsidized price—but here again an overall economic assessment would be necessary.

In addition to these examples, taken from the sphere of heating, many others could be adduced apropos modifying *laissez-faire* in electricity supply by economic planning, so as to get a maximum of production out of a minimum of capital investment.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

AIRCRAFT - MARINE Products, Inc.—" Electrical connectors." 20179/43. November 14th, 1942. (585670.)

Allmanna Svenska Elektriska Aktiebolaget.—" Grid control for static current convertors." 21438/44. November 25th, 1943. (585765.)

Auto-Ordnance Corporation.—" Radio signal receiver." 12401/44. July 20th, 1943. (585723.)

J. R. Bateman.—" Control of electric spot welders." 6310. April 5th, 1944. (585720.)

British Thomson-Houston Co., Ltd. (General Electric Co.).—" Phase inverter circuits." 21573. December 23rd, 1943. (585671.)

British Thomson-Houston Co., Ltd., and R. G. Hibberd.—" Ultra-high-frequency circuits and oscillation generators embodying same." 25524. December 19th, 1944. (585672.) " Electron discharge oscillation generators." 6857. March 19th, 1945. (585673.)

H. J. C. Forrester (Faximile, Inc.).—" Electrolytic recording." 18447. September 27th, 1944. (585739.)

General Electric Co., Ltd., and E. H. Croft.—" Electric supply systems having means for absorbing regenerated power." 1778. February 3rd, 1943. (585660.)

B. M. Hadfield.—" Frequency selective circuits." Cognate applications 9813/44 and 21044/44. May 22nd, 1944. (585688.)

Londex, Ltd., and A. P. Besson.—" Electric switching systems." 12270. June 28th, 1944. (585698.)

J. Lucas, Ltd., and J. A. Laird.—" Electric spark ignition systems for internal-combustion engines." Cognate applications 23469/44 and 166/45. November 24th, 1944. (585776.)

Metropolitan-Vickers Electrical Co., Ltd., N. Ryder and H. V. Harwood.—" Photographic exposure meters." 12901. July 6th, 1944. (585701.)

G. D. Olsson.—" Thermally-operated electric switches." 21265. October 31st, 1944. (585762.)

Patelhold Patentverwertungs & Elektro-Holding Akt. Ges.—" Amplifying arrangement particularly for transmitting amplifiers for audio frequencies and the like." 14049/43. July 17th, 1942. (585667.)

Philips Lamps, Ltd., and H. G. Taylor.—" Magnetic filters." 18404. September 26th, 1944. (585738.)

W. G. Schmidt.—" Electric accumulators." 13795. July 19th, 1944. (Convention date not granted.) (585703.)

Standard Telephones & Cables, Ltd.—" Radio antenna system and associated thermionic valve generator." 20346/44. January 5th, 1944. (585746.) " Indirectly heated cathodes for electron discharge devices." 7993/44. June 2nd, 1943. (585685.)

Standard Telephones & Cables, Ltd., and L. C. Baker.—" Sealing of tubular conductors in electron discharge devices." 7037. May 22nd, 1942. (585677.)

Standard Telephones & Cables, Ltd., and G. Gilliver.—" Electric coils and the like." 24043. December 1st, 1944. (Addition to 558472.) (585783.)

Standard Telephones & Cables, Ltd , J. H. Fremlin and C. H. Foulkes.—" Electric discharge apparatus of the velocity modulation type." 778. January 14th, 1944. (585752.)

R. A. R. Tricker and C. S. Wright.—" High-frequency electrical oscillators." 4702. April 10th, 1942. (585659.)

Westinghouse Electric International Co.—" Regulator systems for electric arc furnaces." 22803/44. November 20th, 1943. (585770.)

Woodhouse & Mitchell, Ltd., and L. Forbes.—" Electrically-operated welding machines." 9525. May 18th, 1944. (585722.)

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Belfast.—April 3rd. Electricity Department. 33-kV armourclad switchgear. (March 14th.)

Birkenhead.—April 5th. Electricity Department. Transformer kiosks. (March 21st.)

Bolton.—April 12th. Electricity Department. Supply for twelve months of transformers ranging from 100 to 1,500 kVA. (March 14th.)

Bradford.—April 22nd. Corporation. Three-phase static transformers. (March 21st.)

Two 350-kW glass bulb type mercury arc rectifiers. (March 21st.)

Bury.—April 9th. Electricity Department. One 5,000-kVA transformer. (March 14th.)

Cleethorpes.—April 30th. Electricity Department.—L.v. cables. (See this issue.)

Dewsbury.—April 4th. Electricity Department. 11-kV cables and four 500-kVA transformers. (March 21st.)

Edinburgh.—April 25th. City Council. Control and indication equipment at Portobello station. (See this issue.)

Erith.—April 14th. Electricity Department. Materials and apparatus for the period ending March 31st, 1948. (March 21st.)

Farnworth.—April 1st. Electricity Department. E.h.v. and l.v. cables, pillar boxes and underground boxes. (March 14th.)

Heston and Isleworth.—April 14th. Electricity Department. One 500-kW rectifier equipment. (March 21st.)

Heywood.—April 21st. Electricity Department. One 5,000-kVA transformer and 5,000 yd of 11-kV cable. (See this issue.)

Madras.—May 1st. Government Electricity Department. Interconnector and auxiliary transformers for Basin Bridge "B" power station. (See this issue.)

Manchester.—April 14th. Electricity Committee. Extensions to fire extinguishing equipment and annual supplies of cable, service cut-outs and service units for domestic consumers. (See this issue.)

Middlesbrough. — April 26th. Electricity Department. One 11,000-V ring main unit, one 250-kVA transformer and one meter testing set. (March 14th.)

Newark.—April 21st. Corporation. 11-kV ring main unit and l.v. switchboard. (March 21st.)

Plymouth.—April 12th. Electricity Supply Department.—L.v. distribution boards. (See this issue.)

Rhondda.—April 26th. Electricity Department. Materials for the year ending March 31st, 1948. (See this issue.)

Salford.—May 3rd. Electricity Department. Metalclad switchgear, transformers, cable and neutral earthing resistances. (See this issue.)

Sunderland.—April 8th. Borough Council. Electrical installations in 384 houses on the Thorney Close estate. Borough engineer, Athenæum Buildings, Fawcett Street.

Wallasey.—April 14th. Corporation. Annual contract for mains cables. (See this issue.)

Orders Placed

Billingham-on-Tees.—U.D.C. Accepted. Electrical installations in 150 houses.—A. Anderson & Sons.

Birkenhead.—Housing Committee. Accepted. Electrical work at Rake Lane hutments (£517).—J. J. Peters.

Islington.—Electricity Committee. Accepted for 12 months. Meters.—Aron Electricity Meter; Metropolitan-Vickers; Sangamo Weston. Boxes.—B.I. Callender's Cables; W. Lucy & Co.; Henley's; Siemens Bros. Cable covers.—Cable Covers, Ltd.

Lowestoft.—Housing Committee. Accepted. Electrical installations at 82 Council houses (£2,267).—Boardley & Roberts.

Manchester. — Electricity Committee. Accepted. Annual contracts for electric water heaters.—Aidas; Heatrae; Hotpoint Electric Appliances; Duncan Low; Simplex Electric Co.; English Electric Co.

Poplar.—Contracts Committee. Recommended. Six boiler units and ancillary plant (£2,881,432).—Clarke, Chapman & Co. Turbo-alternator plant (£424,500 and £714,396).—Metropolitan-Vickers.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Acton.—Extensions to factory for Harris Plating Works, Ltd., 188, Bollo Bridge Road.

Barnsley.—Factory for W. Freeman & Co., Ltd., rubber products makers; W. S. Freeman, managing director.

Bexley.—Houses (58), Royal Park estate; Ideal Building & Land Development Co., Ltd.

Billingham-on-Tees.—Houses (100), Billingham Junction, for U.D.C.; G. Wimpey & Co., Ltd., builders, Dunston-on-Tyne.

Birmingham.—New nurses' home, staff rooms, etc., at Yardley Green Road Sanatorium, for Public Health Committee; W. Norman Twist, architect, Sun Building, Bennett's Hill.

Blyth.—Block of offices for the Blyth Dry Dock & Shipbuilding Co.; J. R. Rutherford & Sons, Minories Joinery Works, Jesmond, Newcastle.

Cardigan.—Houses (38), Greenfield Row (£49,666); W. J. Lewis, builder, Cardigan.

Cheadle.—Agricultural cottages (41) for R.D.C.; surveyor, Council Offices.

Cork.—New factory for T. L. Egan & Co., Ltd., Ballintemple; F. F. Murphy, architect, 46, South Mall.

Cumnock (Ayrshire).—New wool-spinning factory, Ayr Road site; J. Foster & Son, Ltd., Queensbury, Yorks.

Dartford.—Rural houses (52); Ernest James, clerk, R.D.C. Offices, West Hill.

Derby.—Houses (132), Chaddesden Hall estate, and Wood Road, Chaddesden; T. W. East, borough architect, Council House.

Dudley.—Extensions to Guest Hospital, including new maternity block (£100,000); A. T. Butler, architect, 31, Priory Street.

Falkirk.—Houses (56), Bog Road scheme (£64,856); burgh surveyor, Burgh Buildings, Newmarket Street.

Gateshead.—School, Lobley Hill; Hall & Stafford, quantity surveyors, Sunniside Chambers, West Sunniside, Sunderland.

Factory, Team Valley, for North-East Wires, Ltd.; W. Hall, Ltd., builders, Derwentwater Road.

Extensions to new factory for the Brenda Manufacturing Co., at the trading estate; Anglo-Scottish Construction Co., Station Yard, Gosforth, Newcastle.

Grangemouth.—New buildings (£140,000) for Imperial Chemical Industries, Ltd.; manager.

Hexham.—Maternity hospital; U.D.C. surveyor.

Hull.—Flats (66) in two blocks with shop, Porter Street; Andrew Rankine, city architect, Guildhall.

Kensington.—Houses (116), Rackham Street site; Stewart & Hendry, architects, 90, Fenchurch Street, E.C.3.

Leicester.—Houses (100), New Parks estate; J. S. Fyfe, housing architect, Municipal Offices, Charles Street.

Longbenton.—Hostel for Ministry of National Insurance; J. Jackson & Sons, Corporation Street, Newcastle-on-Tyne.

Long Eaton.—Houses (130) and 12 bungalows, Welbeck Road, for U.D.C.; F. Perks & Son, Ltd., builders.

Macclesfield.—Theatre, Derby Street and Exchange Street; A. E. Bradburn, architect, 5, Jordangate.

Malton.—Houses (78), Highfield Road, and between Old Malton Road and Peasey Hill, for U.D.C.; surveyor, Urban Council Offices.

Newark Hawtonville.—County secondary school (£89,050), for Notts E.C.; county architect, Shire Hall, Nottingham.

Penmaenmawr.—Houses (50), Cae Gamdda, for U.D.C.; E. Jones, 3, The Arcade.

Ripponden.—Houses (123), on three sites; surveyor, Urban Council Offices.

Rochdale.—Infants' school, Kirkholt estate (£43,000); S. H. Morgan, borough surveyor.

Rushden.—Houses (120), Higham Road Estate, for U.D.C.; R. Marriott, Ltd., builders, Midland Works, Higham Road.

Salford.—County secondary school for 900 at Cromwell Road; W. A. Walker, city engineer, Town Hall.

Seaham.—Houses (104), in Stewart Street; A. M. Smith, U.D.C. surveyor.

Skipton.—Rebuilding Cononley Parish Church after fire; Wales & Wales, architects, 47, Otley Street.

Stockport.—Extensions, Fylde Lodge High School for Girls; J. C. Ellison, Ltd., builders, Woodford Green, Essex.

Stockton Heath.—Boys' and girls' schools, Stockton Lane; E. M. Parkes, county architect, The Castle, Chester.

Stoke-on-Trent.—Houses (50), Stonor Street, Cobridge; Cornes Construction, Ltd., builders, Hanley.

Sunderland.—Three factories at Pallion for North-Eastern Trading Estates, Ltd.; S. Milburn & Partners, architects, 18, Fawcett Street.

Rebuilding war-damaged factory at Bonnersfield for Bergson & Co., Ltd.; Stephenson & Gillis, architects, 2, Saville Place, Newcastle-on-Tyne.

Tynemouth.—Factory, West Chirton, for Levine & Co., Ltd.; Stephen Easten, Ltd., builders, Westgate Grange, Newcastle.

Wallsend.—Extensions to factory for Thermal Syndicate Co., Ltd., Neptune Road; L. J. Couves & Partners, architects, Carliol House, Newcastle.

Wellington.—School, Donnington Wood, for Shropshire E.C.; A. Guy Chant, county architect, 5, Belmont, Shrewsbury.

Willand (Devon).—County primary school for C.C.; H. V. de Courcy Hague, county architect, 97, Heavitree Road, Exeter.

Winchester.—New county offices scheme for Hants C.C.; C. C. Voysey, county architect, The Castle.

Workington.—Chemical works on old ironworks site, A.S.P. Chemical Co.; Sir Alexander Gibb & Partners, architects, St. Anne's Lodge, London, S.W.1.